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U.S. Department of Transportation
National Highway Traffic Safety Administration

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SAE: Society of Automotive Engineers, Dept. HSL, 400 Commonwealth Drive, Warrendale, Pa. 15096. Order by title and SAE report number.

TRB: Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W. Washington, D.C. 20418.

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ABSTRACT CITATIONS

HS-015 995

VEHICLE TRAFFIC LAW. REV. ED.

Highway traffic regulations are presented, in terms of how they originated, developed, and have become relatively standardized in the different states by mid-twentieth century. Broad areas covered are the background and underlying legal principles of traffic law enforcement, legal requirements which govern and control the making and enforcement of criminal laws in general and traffic laws in particular; specific elements, applicable defenses, and issues involved in particular traffic cases. Specific chapters deal with: human elements in making traffic laws; power to regulate traffic (state, local, and federal control); validity of traffic laws; required obedience; where traffic laws apply; double jeopardy in traffic cases; elements, issues, and defenses involved in traffic cases; speeding offenses; right-of-way violations; driving under the influence of alcohol or other drugs; evading responsibilities following accident; reckless driving, careless driving, and homicide by vehicle; offenses relating to licensing of operators and vehicles; parking, stopping, and standing offenses; and prosecution of traffic cases.

by E. C. Fisher; R. H. Reeder
Northwestern Univ., Traffic Inst., Evanston, Ill.
1974 ; 354p refs
Includes HS-015 996--HS-016 015.
Availability: Corporate author

HS-015 996

THE EMERGENCE OF THE AUTOMOBILE

A historical perspective of the use of the automobile within American society and its impact upon it is presented. Specific inventors and vehicle models are described, along with early court rulings regarding automobile noise and driver carelessness. The permanence of the vehicle is discussed as well as the doctrine of equal rights in the use of streets and highways, among vehicles, horses, wagons, bicyclists, and pedestrians.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED.,
Evanston, Ill., 1974 p1-7
1974 ; 31refs
Availability: In HS-015 995

HS-015 997

LEGAL PROBLEMS ARISING FROM USE OF AUTOMOBILES

The widespread opposition to automobiles when they first began appearing in significant numbers on the streets and highways is described, along with the resulting court cases which considered the danger of the vehicles for the general public. Specific court rulings and statutes are cited. Emphasis is on the automobile as a nuisance, then as a popular means of transportation.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED.,
Evanston, Ill., 1974 p8-13
1974 ; 32refs
Availability: In HS-015 995

HS-015 998

NECESSITY AND PURPOSE OF TRAFFIC REGULATION

The increasing volume of vehicle traffic from the early days of the automobile is described as the reason for traffic regulation laws. It is shown that the courts have taken judicial notice of the drastic effects brought about by the automotive age and have pointed out the necessity for expanding certain traditional legal concepts in order to adapt the law to rapidly changing conditions in U.S. society. Specific court rulings are cited, and the purpose of traffic laws (the prevention of traffic collisions and congestion) is discussed.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED.,
Evanston, Ill., 1974 p14-8
1974 ; 19refs
Availability: In HS-015 995

HS-015 999

DEVELOPMENT OF TRAFFIC LAWS

Court decisions are reported which indicate the need for traffic law development regarding speed, equipment, passing, turning, braking, etc. Curiosities in early traffic laws are described, including common ones relating to vehicle-horse drawn equipment meetings. It is shown that local traffic laws were the first to be developed, followed by state laws and then interstate uniformity. The Uniform Vehicle Code is cited and the importance of uniform traffic laws reviewed. The Highway Safety Act of 1966 is also described, along with the judicial interpretation of traffic laws.

Publ: S-015 995, VEHICLE TRAFFIC LAW. REV. ED.,
Evanston, Ill., 1974 p19-27
1974 ; 30refs
Availability: In HS-015 995

HS-016 000

THE HUMAN ELEMENT IN MAKING TRAFFIC LAWS

Human factors involved in traffic law development, enforcement, and adjudication are discussed. Traffic laws designed to govern human conduct are considered, and it is noted that the laws must recognize human characteristics and driving customs. The purpose of traffic laws as accident prevention is reviewed. Attention is also drawn to the need for laws to set acceptable standards, for them to be known and observed, the injurious effect of inadequate laws, and the need of provision for experimental legislation.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED.,
Evanston, Ill., 1974 p28-32
1974 ; 13refs
Availability: In HS-015 995

HS-016 001

POWER TO REGULATE TRAFFIC

The power to regulate traffic is reviewed in terms of state, local, and federal action. With regard to state control, court rulings are cited which deal with traffic regulation under the power of the state police, the nature and scope of police power, the usage restriction of public highways, the right to deny use of public highways, reasonable exercise of state police power, extension of state regulatory powers to non-residents, the delegation of authority to administrative officers and agencies, and regulations involving penalty. Control by local authorities is considered in terms of: power of municipalities to limit use of streets, and right to regulate traffic on street constituting part of state highways; regulation of private business vehicles, buses and taxicabs, wreckers or tow trucks, and pedestrians and motorists; delegation of authority to administrative officials; authority of police officers to direct traffic; and authority of police administrator to make temporary regulations and place official traffic control devices in emergencies. Federal regulations became important with the onset of increased traffic volume. They are discussed with regard to: the commerce clause of the U.S. Constitution; interstate commerce; federal aid highways; National Driver Register; Highway Safety Act of 1966; National Traffic and Motor Vehicle Safety Act of 1966; and the right of mobility during such crises as civil disturbances, riots, or curfews.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p33-55
1974 ; 146refs
Availability: In HS-015 995

HS-016 002

VALIDITY OF TRAFFIC LAWS

Basic requirements of criminal laws in general are reviewed in terms of traffic violations, penalties, strict construction of penal laws, and mala in se and mala prohibita. It is shown that criminal laws must clearly define the act or standard of conduct to be prohibited or commanded, but that the validity of traffic laws is couched in general terms. Specific court rulings are cited, and laws are noted to be held void for uncertainty. Constitutional aspects of the field are examined with regard to reasonability, equal protection, due process, self-incrimination, and other issues. The validity of municipal ordinances is described in terms of reasonable and unreasonable ordinances, and equal protection. It is noted that a city ordinance may not conflict with a state law although it may cover the same subject. Sign posting requirements are described along with adoption of city ordinances by reference to state law, construction of traffic laws and ordinances, and the general determination of validity.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p56-77
1974 ; 175refs
Availability: In HS-015 995

HS-016 003

REQUIRED OBEDIENCE TO TRAFFIC LAWS

Persons are identified who are or are not required to obey traffic laws. Those who must obey include children, public employees, federal officers and employees, and military personnel. It is emphasized that, with few exceptions, the traffic laws generally apply to every person regardless of position, rank, or status in the absence of statute specifically exempting him. Such exemptions deal with workmen in the roadway, drivers of authorized emergency vehicles, such as police and fire vehicles, and ambulances, when a condition of emergency exists. Ownership of such vehicles is discussed, along with conditions prerequisite to exemption, definition of emergency calls, the validity of specific laws, and the construction of statutes and ordinances.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p78-95
1974 ; 141refs
Availability: In HS-015 995

HS-016 004

WHERE TRAFFIC LAWS APPLY

Definitions are offered for streets, roadways, and alleys, and the extent of the street or highway. A general rule as to private property exempted from traffic laws is given. Further consideration is given to the establishment of streets or highways by public use, toll roads, detours, roads closed or under construction, and miscellaneous places held subject to rules governing highways. Some statutory offenses not limited to highways are identified.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p96-106
1974 ; 93refs
Availability: In HS-015 995

HS-016 005

DOUBLE JEOPARDY IN TRAFFIC CASES

The double jeopardy clause of the Constitution is discussed as it applies to criminal prosecution of traffic cases. Decisions of the U. S. Supreme Court are considered, as well as rulings by state and lower federal courts. Specific state statutes which have expanded the constitutional role are identified, with definitions offered of same offense or same evidence, and courts martial. Offenses against different states, under city ordinance and state law, and involving multiple victims are described. The effect of trial discontinuance, and a new trial obtained by the accused are also considered. Details are also offered on habitual criminal statutes, continuing and non-continuing offenses, the continuous character of an offense as affected by crossing city boundaries, the necessity of pleading former jeopardy, collateral estoppel, and res judicata.

Publ: S-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p107-21
1974 ; 121refs
Availability: In HS-015 995

HS-016 006

ELEMENTS, ISSUES, AND DEFENSES INVOLVED IN TRAFFIC CASES

Various elements of public offenses are discussed as they are set forth in the statute or ordinance defining and creating the offense. Intent and guilty knowledge are identified as elements of the offense, with specific court rulings cited. Invalid defenses in traffic cases include ignorance or mistake of the law, various factors involved in collision cases, non-ownership of vehicle driven, driver intoxication, violation of the law by others, custom and usage, selective enforcement, weather or road conditions, and unlawful means of apprehending the accused. Valid defenses include act compelled by necessity or impossibility of compliance, sudden mechanical failure, coercion by others, double jeopardy, res judicata, collateral estoppel, entrapment, alibi, excuse or exception by statute, and statute of limitations.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p122-33
1974 ; 103refs
Availability: In HS-015 995

HS-016 007

SPEEDING OFFENSES

The speed problem is discussed in terms of law enforcement problems and speed regulations. The absolute and prima facie controversy is considered along with statutes and ordinances which provide for basic speed laws and appropriate reduced speed. Various conditions affecting reasonable speed are reported, as well as provisions relating to control of the vehicle (e.g., assured clear distance ahead), rules applied to night driving, speed zoning, the slow driver, racing, and prosecution of speeding cases (including complaint, evidence, and defenses). Specific court rulings are cited.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p134-52
1974 ; 108refs
Availability: In HS-015 995

HS-016 008

RIGHT-OF-WAY VIOLATIONS

Right-of-way rules and violations are considered in detail with specific applicable court decisions cited in illustration. Consideration is given to: applicability at intersections; right-of-way in absence of traffic controls, at stop signs, at red flashing lights; yield right-of-way sign; left turn right-of-way; shifting right-of-way; pedestrian right-of-way (in crosswalks, at traffic signals, sidewalks, blind pedestrians); vehicles entering roadways from private property; right-of-way of authorized emergency vehicles; right-of-way assigned by traffic Officer or automatic signals; and miscellaneous right-of-way situations. The latter includes funeral processions, traffic circles, mountain roads, driver lane blockage, workmen in the roadway, merging traffic, and moving from parked or stopped position into flow of traffic. Forfeiture or waiver of right-of-way and prosecution of right-of-way cases are also described.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV ED., Evanston, Ill., 1974 p153-70
1974 ; 157refs
Availability: In HS-015 995

HS-016 009

DRIVING UNDER INFLUENCE OF ALCOHOL OR OTHER DRUGS

Traffic offenses in which the condition of the driver or operator is the principal element are described, with specific court decisions cited in illustration. Elements of the traffic offense involving the influence of alcohol are detailed as well as non-elements of the same offense. The offense of driving while ability is impaired is also described along with the combined influence of alcohol and other drugs, or driving under the influence of narcotics or other drugs. Prosecution of such cases involves opinion evidence, circumstantial evidence, chemical tests, and motion pictures or video tapes of the accused. Implied consent laws and roadside chemical tests are also considered.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p171-86
1974 ; 146refs
Availability: In HS-015 995

HS-016 010

EVADING RESPONSIBILITIES FOLLOWING ACCIDENT

Driver responsibility following an accident is discussed with emphasis on his leaving the scene of an accident involving personal injury or property damage. The scope and purpose of state statutes are reviewed along with their constitutional aspects. Elements of the offense are outlined including such extensions of the basic elements as knowledge of the accident and the broader meaning of accident involvement, and specific responsibilities of the driver are detailed, such as rendering reasonable aid and notification of the police. It is shown that the driver's statutory duties cannot be delegated to others, and that persons are criminally liable in hit and run cases. Duties imposed upon persons other than drivers involved in accidents are reported. Non-elements of the offense and prosecution of such cases are also discussed, and court decisions are cited.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p187-207
1974 ; 139refs
Availability: In HS-015 995

HS-016 011

RECKLESS DRIVING, CARELESS DRIVING, AND HOMICIDE BY VEHICLE

Court decisions are cited which illustrate the laws regarding reckless driving. Willful or wanton provisions of the Uniform Vehicle Code are described along with miscellaneous definitions and a summary of reckless driving statutes. Particular items of proof are detailed, including violation of traffic regu-

lations, speed, influence of intoxicants. It is shown that the actual consequences are immaterial. Attention is also drawn to the drowsy or ailing driver. Careless or negligent driving is defined various pertinent statutes shown. Homicide by vehicle is described in terms of murder, voluntary and involuntary manslaughter, and negligent homicide. Further consideration is given to assault with a vehicle, driving conduct resulting in personal injury, and proximate cause of death or injury.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p208-33
1974 ; 202refs
Availability: In HS-015 995

HS-016 012

OFFENSES RELATING TO LICENSING OF OPERATORS AND VEHICLES

Court decisions are cited which illustrate operator's license and registration offenses. The consequences of driving or operating a motor vehicle by an unlicensed persons are outlined, along with the failure to carry license on one's person, failure or refusal to display license on demand of law enforcement officer, and driving while a license is suspended or revoked. Procedures for charging a driving offense while the license is withdrawn are given and the violation of conditional provisions of a license is described. Permitting an unlicensed person to drive is discussed. Various registration offenses are also reviewed, including driving unregistered vehicles and vehicles without proper license plates, what constitutes operating or driving a motor vehicle within registration laws, and persons liable in registration cases.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p234-52
1974 ; 185refs
Availability: In HS-015 995

HS-016 013

PARKING, STOPPING, AND STANDING OFFENSES

Court decisions are cited which illustrate laws regarding parking, stopping, and standing. The involvement of conflicting interests is noted, including the rights of abutting owners. Distinction is made between the three offenses, and their occurrence on rural roadways is examined. Specific parking offenses described are: overtime parking, parking to carry on business, all-night parking bans, parking banned in certain areas, restrictions to one side of the street, restrictions during winter months for snow removal, taxicab stands, and other situations. The enforcement of parking ordinances is considered in terms of presumption from the fact of ownership, as well as the removal and impounding of vehicles illegally parked.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p253-62
1974 ; 67refs
Availability: In HS-015 995

HS-016 014

VARIOUS TRAFFIC OFFENSES CONSIDERED

Some of the more common types of traffic offenses are examined. Those associated with required stops are shown to include stop sign violations, traffic control signal violations, and failure to stop for school buses. Turning offenses are concerned with maneuvers such as turning from the direct course (i.e., left turns, right turns, turns at other than intersections, and lane usage), and U turns. Passing offenses include those associated with overtaking and passing, passing at or near intersections, passing on hills and curves, and in no-passing zones. Other types of offenses considered are: failure to keep to the right; following too closely; failure to signal stops and turns; offenses involving equipment of vehicles such as brakes and lights; exceeding weight and load limitations; failure to observe bicycle regulations; and violations of regulations applying to motorcycles.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p263-86
1974 ; 298refs
Availability: In HS-015 995

HS-016 015

PROSECUTION OF TRAFFIC CASES

The principles applicable to the prosecution of traffic cases are discussed, including rules of evidence, legal requirements as to filing of complaints and information, and other procedure controls. Principals and accessories to a crime are described. It is shown that the underlying purpose of vicarious liability is to place the burden of responsibility upon the owners of automobiles to exercise their right of control over those whom they permit to drive their cars. It is noted that a person should not be permitted to procure the commission of an offense by another and then escape the consequences because he was not the actual, immediate actor. The right to a jury trial for petty offenses is described, as well as the right to counsel in misdemeanor cases. Court decisions related to penalization are given. Pleading and practice in traffic cases are discussed, with special reference to: particular allegations; complaints in particular cases, such as parking violations, failure to stop at a stop sign, speeding, reckless driving, driving under suspension or revocation, or under the influence of alcohol or drugs, and careless driving; to the use of the Uniform Traffic Ticket and Complaint form, which has improved the processing of cases in the nation's traffic courts; and to presumption that the registered owner was driver. Aspects of second and subsequent offenses covered include: constitutionality of repeater statutes; scope and other considerations relating to the prior conviction; and the identity of the person convicted. Civil versus criminal aspects of traffic offenses are examined with emphasis on issues involved in prosecution and civil cases; confusion of civil and criminal aspects of traffic cases by police, drivers, lawyers, judges, and insurance adjusters; and incidental reference during the trial to pending or impending damage suits.

Publ: HS-015 995, VEHICLE TRAFFIC LAW. REV. ED., Evanston, Ill., 1974 p287-314
1974 ; 238refs
Availability: In HS-015 995

HS-016 016

STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, DEC. 4-5, 1974, ANN ARBOR, MICH.

Papers presented from the car crash conference are divided into four groups: collision analysis and injuries; restraint system performance; biomechanics and impact tolerance; and simulation and design. Specific topics deal with: steering assembly; dummy test results; transit bus seats; SMAC reconstruction program; automotive collision fires; three-point harness accident data; frontal collisions of front seat passengers; Volkswagen restraint systems; effect of head and body position and muscular tensing on impact response; air bag restraint system hazards; traumatic distortions of primate head and chest; thorax impact tolerance and response; knee response; femur responses; mathematical models for head injury; safety glass testing; simulation testing.

Society of Automotive Engineers, Inc., 400 Commonwealth Dr., Warrendale, Pa.
1974 ; 683p refs
Sponsored by Mich. Univ., Calif. Univ., San Diego, and the Biomechanics Res. Center, Wayne State Univ. Includes HS-016 017--HS-016 036.
Availability: SAE

HS-016 017

IMPACT PERFORMANCE OF SOME DESIGNS OF STEERING ASSEMBLY IN REAL ACCIDENTS AND UNDER TEST CONDITIONS

The results of a three year field study into the crash performance of three basic designs of steering assembly, fitted to British cars, are described. These systems have evolved to comply with current European and U. S. safety standards. One design, involving a large-area, self-aligning steering wheel mounted on a conventional column, appeared from the field data to be highly effective in preventing serious chest and abdominal injury, but the two systems utilizing axial-collapse steering columns proved to be essentially ineffective in practice. This finding is based on a field accident sample of 108 cases, representative of the severe end of the collision speed and injury spectra. A test program was undertaken to examine the procedures currently used to evaluate steering assemblies. It was found that tests carried out in compliance with FMVSS 203 failed to differentiate between the safe and unsafe systems. It was noted that the mode of damage to the steering assemblies produced by normal testing was quite unlike anything seen in the field. Modifications to the test procedures were made that enabled accident damage to be accurately reproduced, but even under these conditions, the peak load injury criterion failed to show any differences between the designs tested. Only when both peak load and effective loaded area were taken into account could the major differences observed in the field be demonstrated under test. Suggestions are made for alterations to present steering assembly techniques that will allow the impact equipment currently used to predict usefully the field performance of steering assemblies.

by P. F. Gloyns; G. M. Mackay
University of Birmingham (England). Dept. of Transp. and Environmental Planning
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p1-27
Rept. No. SAE-741176 ; 1974 ; 27refs
Availability: In HS-016 016

HS-016 018

EXPERIMENT AND ACCIDENT: COMPARISON OF DUMMY TEST RESULTS AND REAL PEDESTRIAN ACCIDENTS

To clarify to what extent the results gained from known automobile pedestrian impact experiments may be applied to actual accidents, comparisons with the analysis of actual accidents and comparable experiments were made with particular attention to the pattern of damage and the throw distances of the pedestrians. These results produced parameters that should be of additional use in forensic practice for defining the location of collisions on the roadway. The injury patterns sustained by pedestrians involved in traffic accidents were related to vehicle damage and classified with respect to impact geometry. From the conclusions drawn from the pedestrians' motions, impact stress, and tolerance, experimental results may well be applied to the reconstruction of actual automobile-pedestrian collisions. This is true only within distinct classes of impact geometry, characterized by automobile front-end design, pedestrian size, and impact position.

by H. Schneider; G. Beier
Technical Supervisory Assoc. (Germany); Inst. of Forensic Medicine, Univ. of Munich (Germany)
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p29-69
Rept. No. SAE-741177 ; 1974 ; 11refs
Availability: In HS-016 016

HS-016 019

SAFETY CONSIDERATIONS IN DESIGN OF NEW TRANSIT BUS SEATS

The results of a program to develop advanced cantilevered transit bus seats are described. The DOT's Urban Mass Transportation Administration funded the $26 million Transbus Program. Part 1 of the paper discribes the results of a detailed analysis of passenger accidents on-board current transit buses. Part 2 describes the results of sled tests that evaluated the safety of three new cantilevered seat/sidewall section designs proposed for Transbus relative to the safety of current transit buses. The testing facilities and procedures are reported, along with a summary of the results of 16 sled test runs that employed four different sizes of anthropomorphic dummies. The results clearly indicate that the new seats have safety characteristics superior to current transit bus seats, especially in severe crash situations.

by J. A. Mateyka
Booz, Allen Applied Res.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p71-87
Rept. No. SAE-741178 ; 1974 ; 5refs
Availability: In HS-016 016

HS-016 020

RESULTS OF SELECTED APPLICATIONS TO ACTUAL HIGHWAY ACCIDENTS OF SMAC RECONSTRUCTION PROGRAM

The application of the Simulation Model of Automobile Collisions (SMAC) computer program to selected cases of actual highway accidents is reported. Since SMAC was developed to allow accidents to be accurately reconstructed by operators

without a detailed knowledge of engineering mechanics, recent developments have concentrated on providing a Start routine. This program automatically generates the inputs required for SMAC, including collision speed estimates, from a minimum amount of information available at the accident scene. A brief summary of how Start works is given, followed by a discussion of actual cases. The sensitivity of the final reconstruction to the various program inputs is discussed; this gives an indication of how the initial Start inputs may be adjusted to obtain a best fit with the minimum number of interactions of the program. Particular emphasis is given to those types of accidents that are subject to large errors when reconstructed by the more standard analytical procedures; e.g., intersection accidents and accidents involving large spinout trajectories.

by I. S. Jones
Calspan Corp.
Contract Ref: FH-11-7526; Ref: DOT-HS-053-1-146
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p89-111
Rept. No. SAE-741179 ; 1974 ; 6refs
Availability: In HS-016 016

HS-016 021

AUTOMOTIVE COLLISION FIRES

Eight full-scale collision experiments were conducted and 73 collision fire case studies were investigated to provide data relating to fuel system failure modes and susceptibility of fuel system designs to collision fires. Data regarding impact speeds, nature of injuries, and climatic conditions are included. Results of extensive laboratory experiments provide specific ignition conditions for common fuels and define ignition hazards of exhaust systems and electrical and lighting circuitry. The physics of crash fire atmospheres is described, including air quality, radiant and convective heat transfers, and the relationship between burn physiology and occupant escape time. Design concepts are suggested for limiting fuel spillages, ignition sources, and thermal stress to motorists.

by D. M. Severy; D. M. Blaisdell; J. F. Kerkhoff
Severy, Inc.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p113-99
Rept. No. SAE-741180 ; 1974 ; 35refs
Availability: In HS-016 016

HS-016 022

THREE-POINT HARNESS ACCIDENT AND LABORATORY DATA COMPARISON

A combined program of accident investigation, staged collisions, and simulated collisions involving three-point harnessed occupants in frontal force collisions has provided a means of correlating injury with forces and/or other physical parameters associated with the injuries. With a strict screening to ensure complete data on each accident, 128 cases involving 169 occupants at barrier equivalent velocities from 2-53 mph were compared with the results from 11 staged collisions and 72 simulated collisions. There were 14 rib cage injuries ranging from single sternum fracture to seven rib fractures at velocities of 10-53 mph at abbreviated injury scale levels (AIS) of 2 and 3. A single AIS 4 injury was the most serious injury and consisted of a ruptured spleen. The most serious brain injury was an AIS 2. Two cervical vertebra fractures were found. Only 14 occupants had AIS 3 injuries. No abdominal organ injuries, thoracic organ injuries, breast injuries, clavicle fracture, or eye injuries were reported. It is concluded that: the harness is highly efficient in mitigating injuries, rib and sternum fractures are the more prevalent, submarining is not a major problem, females are injured at lower collision severity than males, and age is an important factor in injury susceptibility. The overall tolerance level for 50% injury at the AIS 3 level is 45 mph at an upper shoulder harness load of 1930 lb, a chest Gadd Severity Index of 560, and a peak resultant chest acceleration of 85 g.

by L. M. Patrick; A. Andersson
Wayne State Univ., AB Volvo
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p201-82
Rept. No. SAE-741181 ; 1974 ; 10refs
Availability: In HS-016 016

HS-016 023

RESULTS OF 49 CADAVER TESTS SIMULATING FRONTAL COLLISION OF FRONT SEAT PASSENGERS

By an acceleration track operated through a falling weight with a crash velocity of 50 km/h and a stopping distance of about 40 cm, the effect of three-point-retractor belts on 30 fresh cadavers and of two-point belts with kneebar on 19 fresh cadavers was tested. The age of the cadavers ranged from 12 to 82 years. Almost all injuries known under the term "seat belt syndrome" could be reproduced. The dependence of the degree of injury in regard to the age was quite evident. It can be expected that persons over 40 years of age will suffer the same dangerous injuries as the tested cadavers, caused by the diagonal belts if the same crash conditions exist. The shoulder-belt-forces of all the tests were between 340 hp and 1000 hp; more serious injuries of the cadavers of older persons could be observed. To reduce the risk of injury, improvements of the current restraint systems are necessary, along with constructive changes on automobiles and seats.

by G. Schmidt; D. Kallieris; J. Barz; R. Mattern
University of Heidelberg, West Germany
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p283-91
Rept. No. SAE-741182 ; 1974 ; 17refs
Sponsored in part by Verband der Automobil-Industrie e.V., West Germany.
Availability: In HS-016 016

HS-016 024

A COMPARISON BETWEEN VOLKSWAGEN AUTOMATIC RESTRAINT AND THREE-POINT AUTOMATIC BELT ON THE BASIS OF DUMMY AND CADAVER TESTS

The results of 13 tests simulating a frontal impact against a fixed barrier at 50 km/h and 25 g are described. They show a marked increase in the severity of injuries with increasing age, and more frequent chest injuries than head and spinal injuries.

The tests were made with two types of restraint systems, both of which seemed equal in occupant protection.

by H. Schimkat; R. Weissner; G. Schmidt
Volkswagenwerk A. G., Univ. of Heidelberg
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p293-302
Rept. No. SAE-741183 ; 1974
Availability: Bound in HS-016 016

HS-016 025

EFFECT OF HEAD AND BODY POSITION AND MUSCULAR TENSING ON RESPONSE TO IMPACT

Human volunteers were exposed to increasing levels of sled acceleration and velocity during simulated barrier crashes while seated in a padded, bucket automobile seat and restrained by an advanced, passive, three-point belt which contained energy-absorbing fibers and was integral with the seat structure. By muscular tensing, bracing, and riding with the head flexed, two of the subjects were exposed to crash velocities as high as 30.0 mph (over 33 mph, total velocity change), without suffering significant pain or injury.

by E. Hendler; J. O'Rourke; M. Schulman; M. Katzeff; L. Domzalski; S. Rodgers
Crew Systems Dept. Naval Air Devel. Center
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p303-37
Rept. No. SAE-741184 ; 1974 ; 10refs
Sponsored by the National Hwy. Traf. Safety Administration, Washington, D. C.
Availability: In HS-016 016

HS-016 026

OTOLOGIC HAZARDS OF AIRBAG RESTRAINT SYSTEM

The effects of local slap pressure of airbag development against the external ear and tympanic membrane were studied and the effects on subsequent hearing acuity measured. Adults and infant squirrel monkeys were used as experimental subjects because the gross structure of their ear and tympanic membrane closely resembles man's. To create an adequate simulation of the airbag trauma, a small airbag was fabricated and mounted on a pneumatic impact facility. This device produced a specific velocity to determine the behavior of objects under impact conditions simulating accident kinematics. Cochlear nerve action potentials were measured in both ears of 10 subjects prior to blast, immediately postblast, and several weeks postblast. High-speed photography recorded the events of the blast, as well as the technique of recording the potential from the cochlea and the appearance of the drumhead pre- and posttrauma. No permanent hearing damage, eardrum perforation, or disruption of ossicles occurred at airbag velocities up to 100 mph and a sound intensity level of 150 dB.

by H. J. Richter, 2nd; R. L. Stalnaker; J. E. Pugh, Jr.
University of Michigan. Kresge Hearing Res. Inst.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p339-49
Rept. No. SAE-741185 ; 1974 ; 6refs
Availability: In HS-016 016

HS-016 027

TRAUMATIC DISTORTIONS OF THE PRIMATE HEAD AND CHEST: CORRELATION OF BIOMECHANICAL, RADIOLOGICAL AND PATHOLOGICAL DATA

High speed cinefluorographic studies were performed on anesthetized primates during graded, experimental blunt impacts of the head or chest. Cineframe data were analyzed frame by frame to identify dynamic anatomic movement patterns during each injury. The results indicate that the brain and heart undergo significant displacements within the first few milliseconds post-impact and these transient interior motions were correlated with physiologic and pathologic changes as well as impact force and deceleration.

by S. A. Shatsky; W. A. Alter, 3rd; D. E. Evans; V. Armbrustmacher; G. Clark
Armed Forces Radiobiology Res. Inst.; Armed Forces Inst. of Pathology; Walter Reed Army Medical Center
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p351-81
Rept. No. SAE-741186 ; 1974 ; 21refs
Availability: In HS-016 016

HS-016 028

IMPACT TOLERANCE AND RESPONSE OF THE HUMAN THORAX 2

Additional studies of continuing research on human thoracic injury tolerance and mechanical response to blunt, midsternal, anteroposterior impact loading are reported. Twenty-three additional unembalmed cadavers were tested using previously reported equipment and procedures, with new combinations of impactor mass and velocity. The tests confirmed a strong velocity sensitivity of the force response throughout the velocity range investigated. Several tests were also included in which the cadaver subjects were rigidly supported midsagittally along the spine to preclude whole body motion. The kinematics of thoracic compression under blunt, A-P impact were demonstrated by high-speed cinematography of a thorax unilaterally denuded of skin and superficial tissues to enable visualization of the rib surfaces and intercostal musculature during loading. Response in terms of force-time and deflection-time histories and force versus deflection crossplots, and tolerance in terms of associated necropsy findings and AIS ratings, are presented for all tests. Correlations of the AIS rating with both maximum force and normalized chest deflection, several composite summary plots, and a general data tabulation are also included.

by C. K. Kroell; D. C. Schneider; A. M. Nahum
General Motors Res. Labs., University Hospital, San Diego
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p383-457
Rept. No. SAE-741187 ; 1974 ; 7refs
Availability: In HS-016 016

HS-016 029

ANALYSIS OF CHEST IMPACT RESPONSE DATA AND SCALED PERFORMANCE RECOMMENDATIONS

by R. F. Neathery
General Motors Res. Labs.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa.,

HS-016 030

STATIC FORCE-PENETRATION RESPONSE OF THE HUMAN KNEE

by G. W. Nyquist
General Motors Res. Labs.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa.,

HS-016 031

INVESTIGATION OF FEMUR RESPONSE TO LONGITUDINAL IMPACT

Longitudinal impact tests were conducted on the knees of four seated embalmed cadavers using an impact pendulum. Impact force and femur strain histories were recorded, and peak force at fracture was determined. The results show that femur stiffness (average equals 3.29 MN) for impacts is nearly the same as for static loads. Peak fracture loads varied from 8731-11570 N, all above the fracture criterion proposed by King, Fan and Vargovick. Strain histories and fracture patterns suggest that bending effects play a major role in determining the response of embalmed cadaver femurs to longitudinal impact.

by W. R. Powell; S. H. Advani; R. N. Clark; S. J. Ojala; D. J. Holt
West Virginia Univ.
Contract NIH-NO-1-NS-4-2302
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p539-56
Rept. No. SAE-741190 ; 1974 ; 11refs
Sponsored by the National Hwy. Traf. Safety Administration, Washington, D. C., and the National Institutes of Health.
Availability: In HS-016 016

HS-016 032

MATHEMATICAL MODEL FOR CLOSED HEAD IMPACT

In order to study the head injury mechanism and to clarify the question as to whether the shear strain or the reduced pressure is the primary injury etiology during a given impact, a realistic model capable of predicting both the shear strain and the reduced pressure effects was devised. By use of the finite element displacement formulation, the human head is modeled as a viscoelastic core bonded to a thin viscoelastic shell, which simulates the brain and skull. For purpose of comparison, two configurations (a spherical shape and a prolate ellipsoid) have been used to describe the geometry of the human head. By applying an impact load over a small area of the shell, the head injury mechanisms--such as cavitation, caused by excessive tensile stress, and rotation, produced by large shear strain--along with their possible damage locations, are simulated. Linear viscoelastic properties are assumed for both the core material and the shell. The equations of motion for the problem are in the form of second-order matrix differential equations. Solutions are obtained through the matrix iterative method.

by H. S. Chan
General Motors Res. Labs.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p557-78
Rept. No. SAE-741191 ; 1974 ; 36refs
Availability: In HS-016 016

HS-016 033

SIMULATION OF HEAD INJURY DUE TO COMBINED ROTATION AND TRANSLATION OF THE BRAIN

A mathematical model for head injury prediction is described, based on the hypothesis that injury results from a combination of displacement and rotation of the brain inside the skull. The model is a 12-degrees-of-freedom mechanical system consisting of masses, dashpots, and springs. The classical Lagrange method is used in formulating the equations of motion. Numerical integration is used to obtain their solution. Constants for the elements of the model are obtained from published experimental measurements. Other lumped parameters which have not yet been measured are determined by adjusting them until a satisfactory agreement is obtained between the model's response and equivalent measured responses. The frequency and time responses of the model, for a variety of loading conditions, are studied. Results show a good agreement between experimentally observed and mathematically generated responses. Quantitative validation of some responses was prevented for the lack of experimental measurements. It is concluded that the model provides a way of using multiple injury criteria to estimate the injury potential of severe impact environments.

by N. M. Alem
Highway Safety Res. Inst. Univ. of Mich.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p579-98
Rept. No. SAE-741192 ; 1974 ; 22refs
Doctoral dissertation, "A Discrete-Parameter Head Injury Model."
Availability: In HS-016 016

HS-016 034

DEFINITION AND DEVELOPMENT OF A CRASH DUMMY HEAD

The conception, design, and development of a crash test dummy head are described. Geometric, inertial, and performance requirements based on biomechanical information are presented and discussed. The head design concept is compatible with current head injury assessment procedures, and the configuration is based on the General Motors Research Lab. skull and head geometry models. The manufacture and development are described, and the test procedures and results are presented and discussed with reference to the biomechani-

cal and functional requirements. The resulting dummy head is shown to comply with these requirements.

by R. P. Hubbard; D. G. McLeod
General Motors Res. Labs.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p599-628
Rept. No. SAE-741193 ; 1974 ; 15refs
Availability: In HS-016 016

HS-016 035

EFFICIENCY OF PHANTOM IMPACT TEST IN SAFETY GLASS TESTING

The phantom test is described as indispensable in investigating the safety of passengers impacting windshields. The results of the phantom test depend largely on the construction of the phantom head. Due to the use of phantom heads of varying construction (because of the lack of test regulations), the results of the individual testing installations frequently deviate from one another. In a test series with HPR safety glass (2.0/2.8/0.76 mm flat panes of 24 by 36 in), the effect of several parameters (head mass and head spring suspension, head freely movable or head guided on evaluation values for resultant head acceleration, Severity Index, Head Impact Criterion, tolerance value, and Laceration index) was investigated. The test series was carried out at impact angles of alpha equals 45, 60, and 90 deg at rates of 20-50 km/h. The results, supplemented by motion analysis of the impact process, were compared to the results of sled tests with test dummies previously used by other testing installations on similar glass constructions and under comparable test conditions.

by A. Slattenschek; W. Tauffkirchen; G. Benedikter
Vienna Inst. of Tech.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p629-55
Rept. No. SAE-741194 ; 1974 ; 7refs
Sponsored by the Res. Promotion Fund of the Austrian National Bank and the Federal Ministry of Science and Res.
Availability: In HS-016 016

HS-016 036

THE MVMA TWO-DIMENSIONAL CRASH VICTIM SIMULATION

Various features and operational properties of a two-dimensional mathematical model of crash victim motions are presented. The features include: an eight mass representation of the human body where contact between the crash victim and the vehicle is represented in terms of independent force-deformation properties of the victim and the vehicle; and extensible multi-joint neck and a realistically flexible shoulder joint; a real-line representation of the vehicle interior or exterior where shape is given as a network of points; specific predictive restraint device submodels for the airbag, the energy absorbing steering column, and a slipping, energy absorbing three-point-belt restraint system; and a flexible output package including graphics, an injury criteria monitor, and a variety of options for listing, deleting, and comparing selected output variables. Functional properties of the model and potential applications are demonstrated in the paper by examples.

by D. H. Robbins; B. M. Bowman; R. O. Bennett
Highway Safety Res. Inst., Univ. of Mich.
Publ: HS-016 016, STAPP CAR CRASH CONFERENCE (18TH) PROCEEDINGS, Warrendale, Pa., 1974 p657-78
Rept. No. SAE-741195 ; 1974 ; 10refs
Sponsored by the Motor Vehicle Mfrs. Assoc.
Availability: In HS-016 016

HS-016 037

TRAFFIC FATALITIES AND THE ENERGY CRISIS. FOUR MONTH ANALYSIS--JAN.-APR. 1974

Possible causes for the nationwide drop in traffic fatalities that occurred along with the energy crisis are examined. Among the factors included are gross reduction in traffic volume, shift from night to daytime driving, and the reduced speed limit. It is concluded that approximately one third of the fatality reduction can be attributed to speed reduction. It is also noted that consideration is given only to fatality reduction and not injuries. A general technique for predicting fatality reduction is given.

by J. F. Carpenter
General Motors Corp., Environmental Activities Staff, General Motors Technical Center, Warren, Mich. 48090
Rept. No. A-3176 ; 1974 ; 23p 24refs
Availability: Corporate author

HS-016 038

CALIFORNIA STEAM BUS PROJECT. FINAL REPORT

The California Steam Bus Project is described as it studied the technical feasibility and public acceptance of the external combustion engine as a low-emission, quiet propulsion system, using city buses as demonstration vehicles. The Rankine cycle systems were used. Project findings are cited with regard to performance, emissions, noise, fuel consumption, operating characteristics, revenue service, composite picture, and potential fuel consumption and emissions urban bus road performance; exhaust emissions, fuel consumption, and exterior and improvements. The project was found to successfully achieve its goals, benefiting from the cooperation of public and private entities. Recommendations are offered for future research developments, reducing high fuel consumption, government role, legislation, and funding. Project history is briefly covered, and technical experience detailed. The systems used, William M. Brobeck and Associates, Lear Motors Corp., and Steam Power Systems, Inc., are explained and illustrated in photographs and diagrams. Public service experience, public attitudes, and the potential for improvements of the external combustion engine are commented on. Tables and graphs show exhaust emissions from heavy-duty vehicle engines; cost sharing in the California Steam Bus Project; steam powerplant specifications; interior sound levels of steam

and diesel buses; and characteristics of urban and suburban bus driving cycles.

by J. A. Lane; K. Napuk; R. A. Renner
California Legislature, Assembly Office of Res., Sacramento, Calif.; Scientific Analysis Corp., San Francisco, Calif.; International Res. and Technology Corp., Washington, D. C.
Rept. No. PB-217 508 ; 1973 ; 31p
See also HS-013 291.
Availability: NTIS

HS-016 039

CALIFORNIA STEAM BUS PROJECT. FINAL REPORT OF THE PROJECT MANAGER

The California Steam Bus Project is summarized which developed and demonstrated Rankine Cycle external combustion propulsion systems for urban transit vehicles. Project history, organization, and financing are detailed. Under Phase 1, three contractors were selected to install steam powerplants in conventional motor coaches, replacing the standard diesel engines. The contractors were William M. Brobeck and Associates, Lear Motors Corp., and Steam Power Systems. Each contractor was paired with a transit system operator during Phase 2 under which the modified buses were demonstrated in experimental testing and revenue service. Operational experience of the steam buses in each system is reviewed in detail, along with the overall technical experience of the demonstration program. Policy considerations are examined, particularly with reference to additional future pre-production phases.

by K. Napuk
Scientific Analysis Corp., 4339 California St., San Francisco, Calif. 94118
Contract CA-06-0031
Rept. No. PB-217 509; UMTA-CA-06-0031-73-4 ; 1973 ; 16p
Sponsored by the Urban Mass Transportation Administration, Washington, D. C. Prepared for the Office of Res., California State Assembly, Sacramento. See also HS-013 291.
Availability: NTIS

HS-016 040

CALIFORNIA STEAM BUS PROJECT. PROJECT REPORT ON COMMUNITY ATTITUDE SURVEYS. PHASE 1

Preliminary to a demonstration of Rankine Cycle external combustion propulsion systems in urban transit vehicles, survey data were collected to measure the extent of public concern about air pollution and the extent to which California residents see the need for alternatives in transportation to alleviate or reduce air pollution. Three surveys were conducted and a survey of patron attitudes on steam and diesel buses was designed and pilot tested. Follow-up data will be collected as prototype modified steam buses developed under this project enter revenue passenger service. In the initial surveys, attention was given to public attitudes concerning the most serious contemporary problems, the relative danger of smog and air pollution, the principle causes of air pollution, means of redressing it, frequency of bus use, reasons for present level of bus use, impact of steam propulsion for buses on air pollution, and attractiveness of steam buses. Cross survey analysis is possible, showing that concern for the problem of air pollution was very high, and automobiles were ranked with industry as the principle cause. Other findings are presented, and data tabulations are appended. Sampling methods for each survey are also discussed.

by F. J. Stefanich, Jr.
Scientific Analysis Corp., 4339 California St., San Francisco, Calif. 94118
Contract CA-06-0031
Rept. No. PB-217 510; UMTA-CA-06-0031-73-5 ; 1973 ; 52p
Sponsored by the Urban Mass Transp. Administration, Washington, D. C. Prepared for the Office of Res., California State Assembly, Sacramento. See also HS-013 291.
Availability: NTIS

HS-016 041

OCCUPANT PROTECTION IN CAR-TO-CAR IMPACTS

An analytical study defines the interaction of the occupant and the vehicle as a system for car-to-car impacts. Using basic relationships, the question of vehicle stiffness and mass differential effects on the occupant is discussed. The vehicle characteristics used for the car-to-car impacts are developed from barrier impact data. If passenger compartment integrity can be maintained, the following main conclusions can be stated: the design of the restraint system is the factor that can have the greatest influence on the occupant; the occupant restraint system must be matched to the vehicle in which it is to be used; and, on the basis that reducing the barrier capability of heavy cars does not solve the problem, the occupant restraint system of light cars must be the equalizing factor to provide for compatibility in a traffic mix of light and heavy cars.

by R. G. Fischer
General Motors Corp., Engineering Staff
Rept. No. SAE-740316 ; 1974 ; 9p 1ref
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.
Availability: SAE

HS-016 042

THE EVASIVE ACTION DECISION IN AN INTERSECTION ACCIDENT: A GAME THEORY APPROACH

Game theory is considered as a tool for determining good strategies that will avoid an accident or minimize the severity of the resulting crash. An example is given to illustrate how game theory methodology may be used in choosing an accident avoidance strategy. Details of an accident are reported and the accident investigation problem identified. The methodology is applied, and the analysis indicates that the drivers involved should not be faulted for failing to take an evasive action other than braking, even though such action might have avoided the crash. Additional levels of analysis are advocated and described for involvement in the model before a recommended strategy is formulated.

by J. W. Prentice
Publ: JOURNAL OF SAFETY RESEARCH v6 n4 p146-9 (Dec 1974)
1974 ; 1ref
Availability: See publication

HS-016 043

PERCEPTION OF HIGHWAY TRAFFIC SIGNS AND MOTIVATION

Nine subjects were instructed to drive as safely as possible over a highway route of 257 km and to name all the traffic signs they saw along the route. These subjects were able to report approximately 97% of the signs on the entire route and virtually all of the signs in the nonurban, nonintersection areas, while driving safely and committing no traffic violations. It was concluded that earlier experimental results pointing to the relative inefficiency of highway traffic signs are probably primarily due to the deficient motivation of drivers to utilize them.

by H. Summala; R. Naatanen
Publ: JOURNAL OF SAFETY RESEARCH v6 n4 p150-4 (Dec 1974)
1974 ; 6refs
Sponsored by the Finnish National Board for Public Roads and Waterways and the Humanistic Council of Finnish Academy.
Availability: See publication

HS-016 044

MARIHUANA AND DRIVING RISK AMONG COLLEGE STUDENTS

Studies of the accident involvement of cannabis users have given somewhat contradictory results, so this study investigated the frequency of driving, accident involvement, and driving charges after marijuana use among college students. While 42% of the licensed drivers had used marijuana, only 62% of those reported driving soon after that use. Few reported accidents or moving violations after marijuana use, especially in comparison to after alcohol use. The frequency of marijuana driving occasions is only about 35% that of alcohol driving occasions. It is possible that if legalization resulted in increased exposure, marijuana would not be safer than alcohol for driving.

by R. G. Smart
Publ: JOURNAL OF SAFETY RESEARCH v6 n4 p155-8 (Dec 1974)
1974 ; 10refs
Availability: See publication

HS-016 045

THE EFFECTIVENESS OF OFFICIAL ACTION TAKEN AGAINST PROBLEM DRIVERS: A FIVE-YEAR FOLLOW-UP

The effectiveness of official action such as suspension or probation taken against problem drivers is evaluated. Official action was manipulated randomly up or down one level from the normal course of action selected at the end of a one hour driver improvement interview. Drivers arbitrarily given more-than-normal action at the interview had consistently but insignificantly more subsequent moving violations than did drivers with normal or less-than-normal action. Drivers given less-than-normal action at the interview had significantly more driving accidents subsequently than did drivers with normal or more-than-normal action. A significant interaction with previous official action complicated this second finding: drivers with previous suspension, but less-than-normal action at the interview, had more accidents later than if given normal or more-than-normal interview action. Official departmental action affects later driving accidents but has little effect on moving violations. It is concluded that official action should be progressively more severe if a problem driver doesn't improve.

by D. H. Schuster
Publ: JOURNAL OF SAFETY RESEARCH v6 n4 p171-6 (Dec 1974)
1974 ; 4refs
Prepared in cooperation with the Iowa Dept. of Public Safety.
Availability: See publication

HS-016 046

ALCOHOL IMPAIRMENT IN HIGHWAY FATALITIES IN NORTH CAROLINA, 1972

The proportion of highway fatalities in North Carolina in 1972 that could be attributed to alcohol was examined. Reports of fatal crashes during that period and available blood alcohol data for pedestrian and operator fatalities and for surviving operators were reviewed. Previous driving records for all operators were also reviewed. It was found that the percentage of operators tested for blood alcohol varied widely. Surviving operators were seldom tested at all, whereas 63% of operator fatalities in all types of accidents were tested. Operators in single vehicle collisions were more likely to be tested for alcohol impairment than those in multiple vehicle collisions, and operators who died in accidents that also killed passengers had a higher probability of being tested. The percentages of impaired operators of all operators tested and of all operators involved are given for each type of collision. Of pedestrians, 59% were tested for alcohol, and 62% of those tested were impaired. More than half of the drivers involved in fatal accidents had prior violations.

by A. J. McBay; R. P. Hudson; N. Hamrick; J. Beaubier
Publ: JOURNAL OF SAFETY RESEARCH v6 n4 p177-81 (Dec 1974)
1974 ; 2refs
Supported in part through the North Carolina Governor's Hwy. Safety Program, by the National Hwy. Traf. Safety Administration, Washington, D.C.
Availability: See publication

HS-016 047

SEVEN "TRAPS" EVERY DRIVER SHOULD KNOW

Seven hazardous situations that all drivers should know about and try to avoid are described. They include: the left turn trap, the moving car illusion trap, the work area trap, the blindgate trap, the left side road and overtaking trap, the creeper (i.e., slow moving vehicle) trap, and the rainy-night expressway situation. Suggestions are offered for avoiding possible collisions associated with these locations and vehicles.

by E. D. Fales, Jr.
Publ: AUTOMOTIVE FLEET v14 n2 p26-7, 29 (Dec 1974)
1974
Availability: See publication

HS-016 048

FIFTY-FIVE MPH. WHAT HAPPENED TO SPEED, TRAVEL, ACCIDENTS AND FUEL WHEN THE NATION'S MOTORISTS SLOWED DOWN

The effects of the energy crisis-inspired 55 mph national speed limit established voluntarily in the fall of 1973, and signed into law January 2, 1974, are examined. Focus is on changes in the established patterns of three key traffic characteristics: speed, travel, and accidents. Data are presented to provide a perspective for assessing the relative significance of these three factors in the accident reduction. It is noted that speeds have become more uniform with little difference between the speed of individual vehicles, providing a safer driving environment with less potential for accidents. The importance of traffic law enforcement is emphasized. Several factors related to the energy crisis are discussed which contributed to the reductions in travel, including limited gasoline availability, price increases, and general cost of living increases. Reductions in accidents are described, along with fuel conservation effects.

by W. W. Rankin
Publ: HIGHWAY USER QUARTERLY p11-7 (Fall 1974) 1974
Availability: See publication

HS-016 049

CARAVANS IN TRAFFIC CRASHES

All traffic crashes that occurred during the year ending June, 1973, and that involved caravans towed by cars or similar vehicles were studied. Major conclusions are that crashes involving caravans constituted 0.35% of the total and 0.18% of all casualty crashes, involving 0.51% of traffic crash fatalities and 0.19% of traffic crash non-fatal casualties. Although there were fluctuations from quarter to quarter, no marked changes in the involvement of car-towed caravans in traffic crashes over the last 5 1/2 years appeared to have occurred. Caravan-involved crashes tended to occur more in the mid-morning through late afternoon, late in the week or early in the weekend, and in months with major holidays. The bulk of drivers of vehicle towing caravans involved in the crashes studied had 10 or more years driving experience, were male, and aged 30 or older. Under apparently good conditions, a large proportion of vehicle towing caravans exceeded the open road limit for most caravans of 45 mph. The largest single characteristics of caravan-involved crashes was overturning without leaving the roadway (in 25% of the crashes studied), followed by opposite direction side-swipe and head-on collisions, and side-swipes with vehicles going in the same direction. In nearly 50% of the crashes, the stability of the caravan/towing vehicle combination appeared to have been a factor in the crash, either in the precrash or the crash phase of the collision. Recommendations are offered for reducing such collisions.

by R. G. Vaughan
Dept. of Motor Transport, New South Wales.
1974 ; 43p 9refs
Availability: Traffic Accident Research Unit, Department of Motor Transport, New South Wales, Australia

HS-016 050

FURTHER DEVELOPMENTS IN THE MANUFACTURE AND APPLICATIONS OF STEEL CHROME-PLATED CYLINDER LINERS WITH SPECIAL REFERENCE TO CAVITATION AND EROSION PROBLEMS ON THE WATER SIDE

A method of obtaining greater power in internal combustion engines is described, especially for industrial vehicles, by increasing the cylinder bore through the fitting of thin steel chrome-plated cylinder liners to substitute the heavier conventional cast iron liners. These chrome-plated steel liners have a longer life due to the chrome coating and their adequate surface finish, both on normally aspirated and on supercharged engines. A comparative study is made of the resistance of steel and cast iron materials. The problem of cavitation on the water side is also examined and a well-proven solution is offered.

by J. Retolaza
Aplicaciones Industriales de Cromo Duro S. A.
Rept. No. SAE-740315 ; 1974 ; 13p 8refs
Presented at the Automotive Engineering Congress, Detroit, Mich., 25 Feb - 1 Mar 1974.
Availability: SAE

HS-016 051

PREDICTION OF NIGHTTIME DRIVING VISIBILITY FROM LABORATORY DATA

The application of laboratory threshold visibility data to the subject of driving visibility with heat absorbing glass is reviewed in an attempt to resolve excessive differences between calculated predictions and road test observations. New calculations are described that yield predicted losses of visibility distance due to the use of heat absorbing glass rather than regular glass in automobile windshields. The predicted losses agree satisfactorily with the observed losses for road tests, which average approximately 3%. The new calculations have made use of a revised visual exposure interval of 1/5 sec corresponding with five visual fixational pauses per second a new simulation model that assumes that the target-to-background contrast increases with reduced headlamp-to-target distance.

by D. W. Dunipace; J. Strong; M. Huizinga
Publ: APPLIED OPTICS v13 n11 p2723-34 (Nov 1974) 1974 ; 16refs
Availability: See publication

HS-016 052

A STUDY OF 25 PRINT ADVERTISEMENTS ON DRINKING AND DRIVING. FINAL REPORT

Print advertisements, among the most widely used forms of public information and education campaign materials, are discussed. It is noted that little is known regarding the contribution of this media with respect to effectiveness of knowledge, attitude, or belief change in an audience. The present study, utilizing a combination of research strategies, sought to measure the relative value of various print advertisement themes and appeals used in public information programs on alcohol and highway safety. Each of 25 advertisements was

evaluated in terms of technical quality, factual accuracy, probability of attitudinal or behavioral change, and actual short-term changes in audiences' beliefs and attitudes regarding drinking and driving. The ads differed greatly in terms of perceived effectiveness, but none produced significant changes in beliefs or attitudes.

by J. W. Swinehart; A. C. Grimm; R. L. Douglass
Hwy. Safety Res. Inst., Univ. of Mich., Ann Arbor, Mich., 48105
Rept. No. UM-HSRI-AL-74-7 ; 1974 ; 207p
Sponsored by the Distilled Spirits Council of the U. S., Inc., Washington, D. C.
Availability: NTIS

HS-016 053

LOCKED-WHEEL PAVEMENT SKID TESTER CORRELATION AND CALIBRATION TECHNIQUES

The objective of the National Cooperative Highway Research Program Project 1-12(2) was the development and verification of methods for improving the ability to measure reliably the skid resistance of wet pavement surfaces with skid testers in conformance with ASTM Method E-274-70. The approach used to improve the understanding and reliability of pavement skid resistance measurement involved: contacts with skid tester owners to collect information on test equipment and operating procedures; conduct of laboratory and field experiments to determine the effect of specific variables on skid resistance measurement; computer simulation studies on the influence of equipment dynamics on skid tester performance; development of tentative recommendations for reducing the variability in skid resistance measurement; and conduct of a two-week skid tester correlation program to verify and modify the tentative recommendations. An analysis of variance performed on data collected during the correlation program indicates that the precision of skid testers, although not completely satisfactory, is generally better than their accuracy. The factors most responsible for the initial poor correlation, in order of decreasing effect, were: force calibration and wheel-load errors; data interpretation and evaluation; water systems; and temperature differences. Applications and recommendations are outlined.

Publ: NCHRP RESEARCH RESULTS DIGEST n49 p1-5 (Sep 1973)
1973
Based on NCHRP-Proj-1-12(2), "Locked-Wheel Pavement Skid Tester Correlation and Calibration Techniques," by W. E. Meyer; R. R. Hegmon; T. D. Gillespie, Pennsylvania State Univ., University Park, Pa.
Availability: NCHRP Program Director Hwy. Res. Board, 2101 Constitution Ave., N. W., Washington, D. C. 20418

HS-016 054

THE TOYOTA ESV. SUCCESS AND POSSIBLE TECHNOLOGICAL FEEDBACK

Toyota's goals in developing its experimental safety vehicle (ESV) are explained and the vehicle's major safety features are reviewed. The success of the Toyota ESV project is evaluated, along with the possibilities for technological feedback, and the general direction of future research on automotive safety. Specific details are given on: service brake system; steering and suspension systems; lighting system; instrument display and control; interior; power train; vehicle body; bumper subsystems; occupant restraint system; crash sensor; and other subsystems. Further consideration is given to braking, steering and handling, visibility, crashworthiness, post-accident safety, and pedestrian safety. It is concluded that much technology on automobile safety was gained through development of the ESV and this technology will be developed into more reliable and practical forms for application to cars produced for the market. Effort should be made to use the knowledge gained to develop a concept of a more practical and economical safety vehicle.

by M. Onishi
Publ: THE WHEEL EXTENDED v4 n2 p24-36 (Autumn 1974)
1974
Sponsored by the Japanese Ministry of International Trade and Industry and the Ministry of Transp.
Availability: See publication

HS-016 055

THE PSYCHOLOGICAL SIDE OF SAFETY. WILL SAFER CARS LEAD TO SAFER DRIVING?

Psychological factors related to traffic safety are examined with regard to various experimental safety vehicle projects. Driver attitudes are considered in an evaluation of subjective safety vs, objective safety. Subjective safety is defined by the author as the attitude of every driver believing he drives safely at all times. A driver keeps his subjective safety continually at the 100% level by regulating his behavior. How a driver regulates his driving behavior will determine the degree of objective safety. A person who is absent-minded, for example, is apt to cause accidents frequently, although subjectively he may believe himself to be a model driver. On the other hand, a person who tends to be prudent will rarely cause an accident. The conclusion then is that if the level of objective safety were brought up to or above the level of subjective safety accidents would be prevented. It would appear that an individual's personal standards of safety vary with the situation and so the challenge of developing an ESV are seemingly impossible. There is still much to be done to achieve noteworthy technical advances in the field.

by O. Hirao
Publ: THE WHEEL EXTENDED v4 n2 p21-3 (Autumn 1974)
1974
Availability: See publication

HS-016 056

SAFETY FOR LIGHT CARS. THE CHALLENGE OF JAPAN'S ESV PROGRAM

Background and goals of the Japanese experimental safety vehicle (ESV) program are described which emphasize both accident avoidance and occupant protection. The selection of Toyota, Nissan, and Honda for ESV research is discussed, along with their differences in specifications. Prototype designs are reported and illustrated which show energy absorbing devices and materials. Results of the collision tests demonstrated the great potential value of safety technology for small

cars. Some questions raised by the ESV program are examined.

by H. Numasaki
Publ: THE WHEEL EXTENDED v4 n2 p11-20 (Autumn 1974) 1974
Availability: See publication

HS-016 057

JAPAN'S ESV PROJECT. ADVANCES IN JAPANESE SAFETY ENGINEERING

The author discusses the United States Experimental Safety Vehicle project and feels that the effort to reduce the number of injuries and deaths caused by traffic accidents by improving the degree of safety of the automobile is feasible. However, difficulties unique to the lighter weight, smaller Japanese cars, present problems other than those presented in American manufactured automobiles. While brake performance specifications in both countries were the same, handling and stability requirements are stricter in Japan and standards for occupant restraints vary. Three Japanese companies participated in a development program to meet Japanese specifications, each company establishing development goals based on an independent viewpoint. Prototypes were developed and tested with the results announced at the Fifth International Technical Conference on Experimental Safety Vehicles, London, 1974.

by K. Higuchi
Publ: THE WHEEL EXTENDED v4 n2 p4-10 (Autumn 1974) 1974
Availability: See publication

HS-016 058

HUMAN, MACHINE, AND ENVIRONMENT ASPECTS OF SNOWMOBILE DESIGN AND UTILIZATION

The major problems related to snowmobile use--damage and injury-producing accidents, noise pollution, damage to private property, and detrimental effects on natural ecology--are described and analyzed. Examples are given that typify the current state-of-the-art investigations of the problem areas. It is noted that such studies, both scientific and engineering, have dealt only in piecemeal fashion with some of the most widely acknowledged problems. The paper examines the existing need for a system-oriented program of research designed to provide data for a wide range of design standards capable of assuring the survival of this form of recreation.

by G. F. Rabideau
Publ: HUMAN FACTORS v16 n5 p481-94 (Oct 1974) 1974 ; 12refs
Availability: See publication

HS-016 059

THE ROLE OF THE DRINKING DRIVER IN TRAFFIC ACCIDENTS. (THE GRAND RAPIDS STUDY.) (DIE ROLLE DES ALKOHOLISIERTEN FAHRERS BEI VERKEHRSUNFALLEN. (GRAND RAPIDS STUDIE))

Blood alcohol concentrations (BACs) over 0.04% are found to be definitely associated with an increased accident rate, with the probability of accident involvement increasing rapidly at BACs over 0.08% and becoming extremely high at BACs over 0.15%. When drivers with BACs over 0.08% have accidents, they tend to have more single-vehicle accidents, more severe (in terms of injury and damage) accidents, and more expensive accidents than sober drivers. BACs of 0.04% and below apparently are not inconsistent with traffic safety. The driver classes with the worst accident experience, in addition to the alcoholically impaired, are the young or very old, the inexperienced, and those with less formal education. Persons with the most education, those with better jobs, and the middle-aged, have better than average accident experience. The effects of alcohol are consistent within the various socio-economic classes considered. High BACs are always associated with bad accident experience. At the higher BACs, the difference in the accident potential between the various classes of drivers is unimportant. An important aspect of the survey technique as it was conducted in Grand Rapids is that it is adaptable to assessing the effect of various countermeasures directed at the drinking driver.

by R. F. Borkenstein; R. F. Crowther; R. P. Shumate; W. B. Ziel; R. Zylman
Publ: BLUTALKOHOL v11 suppl p1-132 (1974)
Rept. No. C-20330-F ; 1974 ; refs
German summary.
Availability: See publication

HS-016 060

SUMMARY AND ASSESSMENT OF SIZES AND WEIGHTS REPORT. SUMMARY REPORT

A 1968 study entitled "Economics of the Maximum Limits of Motor Vehicle Dimensions and Weights" is summarized, and a sensitivity analysis of the key findings is included. The report concluded that the technical input data to the 1968 study are adequate and that benefit cost analyses support the economic justification on the Federal-aid Highway Systems of increasing the single and tandem axle weight limitations to 26,000 and 44,000 lbs, respectively. The report also supports the conclusion that gross loads may be increased to at least 120,000 lbs or no gross load need be specified and instead axle weight and spacing may be employed as the control. Related reports issued by the FHA are cited.

by D. Solomon; J. Boos; R. McComb; S. Smith; T. Wilbur; M. Freitas; C. Galambos; S. Williams
Federal Hwy. Administration, Washington, D. C. 20590
Rept. No. FHWA-RD-73-67 ; 1972 ; 54p 2refs
Availability: NTIS

HS-016 061

REVIEW OF SAFETY AND ECONOMIC ASPECTS OF INCREASED VEHICLE SIZES AND WEIGHTS

Questions of safety, the economics associated with the use of larger trucks, construction and maintenance effects upon the Federal aid system, and some general economic and social considerations regarding Congressional legislation on increases in weight limits on vehicles using the interstate highway system are examined. Safety conclusions include: there appears to be no evidence that increased sizes and weights will result in increased commercial vehicle accident involvement; there is some indication of safety benefits resulting form in-

creased allowable sizes and weights in terms of vehicle stability and braking; and collisions involving larger vehicles may be more severe. Engineering economy conclusions are: vehicle width of 102 in. would improve loading facilities for some modular-dimension products, would increase cubic capacity, and would provide space at the rear axle for differential and braking system improvement. It is also concluded that commercial vehicle dimension changes can be regarded as a technological change to further the competitive position of the motor freight carrier. Significant economies and potential benefits derive from the competitiveness of the industry due to its low entry costs, flexibility of its service, and technological changes including increased vehicle dimensions. Non-quantifiable effects of increased sizes and weights such as the community effects of noise, pollution, aesthetics, and reduced motor carrier services for small communities, and user effects such as auto driver apprehension and resentment were examined and found generally not to be negative effects. The diesel fuel tax increase of two cents/gal. and the graduated use tax recommended in the Highway User Act of 1969 will bring vehicle taxes up to consistency with the costs they now occasion as well as cover the added costs that would result from increasing the size and weight standards on the interstate and other federal-aid systems.

Federal Hwy. Administration, Washington, D. C.
1969 ; 224p 74refs
Availability: Corporate author

HS-016 062

ECONOMICS OF THE MAXIMUM LIMITS OF MOTOR VEHICLE DIMENSIONS AND WEIGHTS. VOL. 1. FINAL REPORT

Determining the desirable maximum limits of dimensions and weights of motor vehicle is approached on the basis of highway cost and the operating cost so far as the factors of economy are concerned. Axle weight, gross vehicle weight, and vehicle length are analyzed on the basis of six highway systems consisting of the rural and urban systems within the interstate, primary, and secondary highway systems. The analysis is based on data on truck weight studies conducted in 46 states; operating cost data obtained from truck fleet operators; and experimental data on pavements and bridges obtained from the comprehensive AASHO road test. Numerous other studies also contributed to the findings of the report. The desirable limits of dimensions and weights were found to be the following: vehicle height of 13.5 feet; vehicle width of 102 inches; maximum lengths on all highways of 40 feet for single-unit trucks and trailers, 55 feet for tractors and semitrailers, and 65 feet for any other combination of vehicles; axle weight limits of 22,000 and 38,000 pounds for single and tandem axles respectively; and gross weight limit of at least 120,000 pounds, or no gross weight limit at all with control of axle weight and spacing. Vol. 2 is HS-016 063, which includes chap. 10-17.

by R. Winfrey
Federal Hwy. Administration, Environmental Design and Control Div., Washington, D. C. 20590
Rept. No. FHWA-RD-73-69 ; 1968 ; 281p refs
Vol. 2 is HS-016 063. See also HS-016 060.
Availability: NTIS

HS-016 063

ECONOMICS OF THE MAXIMUM LIMITS OF MOTOR VEHICLE DIMENSIONS AND WEIGHTS. VOL. 2. FINAL REPORT

For abstract, see vol. 1, HS-016 062, which includes chap. 1-9.

by R. Winfrey
Federal Hwy. Administration, Environmental Design and Control Div., Washington, D.C. 20590
Rept. No. FHWA-RD-73-70 ; 1968 ; 397p 71refs
Vol. 1 is HS-016 062. See also HS-016 060.
Availability: NTIS

HS-016 064

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. PT. 6, TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION AND MAINTENANCE OPERATIONS

The uniform standards for traffic control devices to be used during street and highway construction and maintenance operations are applicable to all public roads regardless of type or class, or agency having jurisdiction. Signs are described in terms of design, illumination and reflectorization, positioning, and methods of erection. Types covered include regulatory signs, warning signs, and guide signs. Barricades and channelizing devices are discussed with regard to their function, design, construction and application. The function and types of lighting devices are examined, including floodlights, flashing and steady electric lamps, barricade warning lights, special lighting units, and lanterns or torches. Various types of traffic control through work areas are given, including hand signaling devices, flagmen, one way traffic, flag-carrying or official car, pilot car, and traffic control signals. Expressways and limited access facilities are discussed in terms of application of standards, problem areas, signs, barricades and channelization, lighting devices, and traffic control.

Federal Hwy. Administration, Washington, D. C.
Rept. No. ANSI-D6.1-1971 ; 1971 ; 64p
Prepared in cooperation with the American Assoc. of State Hwy. Officials and the National Joint Com. on Uniform Traffic Control Devices.
Availability: GPO $1.25

HS-016 065

A STUDY OF THE EFFECTS OF LOW LEVELS OF CARBON MONOXIDE UPON HUMANS PERFORMING DRIVING TASKS. FINAL REPORT

The effects of low levels of carbon monoxide (CO) on human performance were studied in driving-related laboratory tasks and in over-the-road vehicle driving. Twenty-seven subjects ranging in age from 20 to 50 years participated in these experiments under conditions of 17% carboxyhemoglobin (COHb), 11% COHb, and Control, or no-administered carbon monoxide. The laboratory tests measured: complex psychomotor reactions involving simultaneous performance of a primary and secondary task; dark adaptation and glare recovery; peripheral vision; and depth perception. The driving task was designed to evaluate driver visual information needs and the

steering wheel movements needed to keep a vehicle properly positioned within the driving lane at different speeds. Results of the laboratory tests show: for the central complex task, no significant differences were found between CO and control conditions, except slightly more incorrect responses with CO with minimal prior test experience; no effect on central task reaction times at COHb levels of 11% and 17%; with the peripheral complex task, overall responses showed no CO-related differences, though greater variability with CO was found at one level; more response blocking seemed to occur at both CO levels than at control conditions; CO effects on interactions between central and peripheral tasks showed more peripheral responses omitted at 17% COHb, less markedly at 11%; dark adaptation threshold values obtained on different days showed no significant CO related differences; glare recovery time showed no significant CO related differences; on peripheral vision tests, subjects missed significantly more targets presented at 20° from their central fixation point at 17% COHb level, but at 11% COHb, the difference was not statistically significant; and no differences related to CO were found in depth perception.

by R. A. McFarland; W. H. Forbes; H. W. Stoudt; J. D. Dougherty; T. J. Crowley; R. C. Moore; T. J. Nalwalk
Harvard School of Public Health, Guggenheim Center for Aerospace Health and Safety, 665 Huntington Ave., Boston, Mass. 02115
Contract CAPM-9-69(2-70)
Rept. No. PB-233 894; CRC-APRAC-CAPM-9-69-2 ; 1973 ; 110p 18refs
Rept. for 15 Jun 1970-15 Sep 1972. Prepared for the Coordinating Res. Council, Inc., New York and the Environmental Protection Agency, Durham, N. C.
Availability: NTIS

HS-016 066

NONDESTRUCTIVE TESTING. PT. 2: BASIC TECHNIQUES

Two basic nondestructive testing methods are discussed: infrared and olfactronics. Procedures for each type are given, and details are presented for the active heating technique and a computer controlled technique for infrared testing, along with a means of thermal nondestructive testing. The development of olfactronic procedures is also illustrated. Eddy current testing by electromagnetic methods, which is not being practiced but is under development, is the only possible application of electromagnetics discussed. A survey shows that in spite of interest on the part of the military, aircraft tire rebuilders, test equipment manufacturers, and tire manufacturers, there is still only a minimal use of nondestructive testing, although there is a great demand and potential for it.

by P. E. J. Vogel
Publ: RUBBER AGE v106 n12 p57-64 (Dec 1974)
1974
See also HS-015 932.
Availability: See publication

HS-016 067

CATALYTIC CONVERTERS: HELP OR HAZARD?

The controversy surrounding the use of catalytic converters in trucks and automobiles is discussed. It is shown that the manufacturers are split on the issue, with General Motors supportive and Ford and Chrysler opposed but reconciled to their use. A new catalytic converter is described which uses about 40% less noble metal and which is being installed in several Chrysler intermediates and compacts. Details are offered on how the converter works. Problems with its use are cited, including the dangerous levels of sulfuric acid produced by sulfur in gasoline coupled with the action of the converter.

Publ: FLEET OWNER v69 n12 p136, 138, 140 (Dec 1974)
1974
Availability: See publication

HS-016 068

SHOCKS. THE OVERLOOKED SAFEGUARD

The importance of shock absorbers in heavy-duty trucks is discussed with emphasis on their disregard by fleetmen. It is shown that the shocks perform a vital safety function which should not be overlooked so readily. Shock manufacturers are listed. The kinetic energy conversion into heat energy by shock absorbers is described. Maintenance procedures are given, including a Shock Absorber Diagnostic Procedure chart, citing condition or cause, and the proper means of correction.

by L. J. Rocheford
Publ: FLEET OWNER v69 n12 p45-9 (Dec 1974)
1974
Availability: See publication

HS-016 069

DIE ALKOHOLBEGUTACHTUNG BEI TRAUMATISIERTEN UND NARKOTISIERTEN (THE EVALUATION OF BLOOD ALCOHOL IN TRAUMATIZED AND ANESTHETIZED INDIVIDUALS)

The blood alcohol evaluation of traumatized and anesthetized individuals entails minor and seriously injured cases, requiring a localized therapy and general medical measures. In cases of driving while intoxicated, precipitating a completed resorption, a retroactive computation at 0.01 1/mg/h may result in detrimental prejudice to a suspect. More frequently there is a favoring distinctly exceeding the customary measure. This evolves whenever a state of shock occurs, evidenced by multiply traumatized victims or those suffering great loss of blood, more rarely in cases of skull brain trauma. The so-called constant beta factor, which primarily purports to be a function of the quantity of fluid present in the body, is increased, causing the blood alcohol curve in a state of shock to recede at an accelerated rate of speed. Provided the evaluation of mental competency is the focal point of interest, the computation of the blood alcohol concentration for the time of the offense should be effected at more than 0.02 1/mg/h. A value for retroactive computation of 0.035 1/mg/h does not appear excessive in severe states of shock.

by H.-F. Brettel
Publ: BLUTALKOHOL v11 n1 p1-10 (Jan 1974)
1974 ; 35refs
Text in German. English summary.
Availability: See publication

HS-016 070

ERFOLGE, ENTTAUSCHUNGEN UND VORAUSSETZUNGEN DES KAMPFES GEGEN ALKOHOLBEDINGTE VERKEHRSGEFAHREN (SUCCESS, DISAPPOINTMENTS AND ASSUMPTIONS IN THE CAMPAIGN AGAINST ALCOHOL-RELATED TRAFFIC ACCIDENTS)

Figures are presented to show the factors and the significance of general delinquency and alcohol delinquency in drivers in particular. A reduction from 1964 to 1971 in drinking driver traffic violations in comparison with other groups of offenders is noted. Reasons for this reduction include successful educational and instructional programs by unions, and law enforcement efforts. A 50% reduction in the number of traffic victims per person kilometer in Berlin in the next 10 years is suggested as a priority goal. Education, supervision, and law and order are to be used along with more stringent punishments by the traffic courts.

by H. Seib
Publ: BLUTALKOHOL v11 n1 p11-28 (Jan 1974)
1974
Text in German. English summary.
Availability: See publication

HS-016 071

ALKOHOLFAHRTEN AUF DEM VW-SIMULATOR (ALCOHOL TEST DRIVES ON THE VW-SIMULATOR)

A simulated alcohol test with 25 subjects verified many already known facts as well as provided additional facts important in determining driving security below the new West German limit of 0.80% blood alcohol concentration. It is shown that the fast consumption of alcohol on an empty stomach may lead to heavy outfall symptoms in the field of sensory motor coordination. There is no possibility for an exact calculation of the ascending curve as a measurement for still existing or no longer existing driving security, even under the presumption that not only body weight and the results of a blood alcohol analysis are known, but also time of consumption and quantity of the alcohol and other data. It is uncertain to which extent the time of ingestion before the intoxication and the liquid quantity absorbed with the alcohol can be of influence.

by H. Lewrenz; G. Berghaus; G. Dotzauer
Publ: BLUTALKOHOL v11 n2 p104-22 (Mar 1974)
1974 ; 14refs
Text in German. English summary.
Availability: See publication

HS-016 072

DIE FAHRT UNTER ALKOHOLEINFLUSS ALS ORDNUNGSWIDRIGKEIT UND ALS VERGEHEN (DRIVING UNDER THE INFLUENCE OF ALCOHOL AS A TRAFFIC VIOLATION AND AS A CRIMINAL OFFENSE)

Initial data indicate that the so-called .08 blood alcohol concentration (BAC) law, which became effective on July 26, 1973, has led to a noticeable, and in part even significant, reduction in alcohol-related traffic accidents. To achieve permanent results, impartial application of these new regulations must be coupled with appropriate information campaigns by the media, concurrent with appropriate enforcement actions, such as selective traffic law enforcement and high police visibility. Regarding the application of the new regulations, the points specifically addressed are: the interpretation of the term ".08 BAC", the legality of the mandatory revocation of driver's permits, as well as such questions of legal proceedings and administration of justice as the adjudication of individual cases under administrative or criminal procedures. Also discussed is the necessity of appropriate countermeasures and prevention of contributory actions (by third parties) such as making vehicles available to individuals in impaired condition, thereby directly contributing to alcohol-related accidents. It is suggested that criminal adjudication not be discarded in favor of the more lenient administrative adjudication and that cases of alcohol-related accidents be referred to the courts for criminal adjudication in direct correlation with the degree to which the BAC levels of those involved exceed .08 and approach a level of .13, or total incapacitation.

by H. Janiszewski
Publ: BLUTALKOHOL v11 n3 p155-77 (May 1974)
1974
Text in German. English summary. Revised and expanded paper originally presented at the German Conference of Traffic Court Officials (12th), Goslar, Jan 1974.
Availability: See publication

HS-016 073

GRUPPENGESPRACHE NACH WIEDERHOLTER TRUNKENHEIT AM STEUER (DISCUSSION GROUPS FOR DRUNKEN DRIVING REPEATERS)

A special form of group driver improvement meetings in West Germany for persons who were fined several times for alcohol-related traffic violations, but who are not known either as drunkards or criminals, is discussed. The central concept and the role of the moderator are presented in detail, and critical comments and preliminary data on evaluation of success are given.

by W. Winkler
Publ: BLUTALKOHOL v11 n3 p178-88 (May 1974)
1974 ; 18refs
Text in German. English summary.
Availability: See publication

HS-016 074

DIE ENTWICKLUNG DER ALKOHOLUNFALLE UNTER BESONDERER BERUCKSICHTIGUNG "ALKOHOLAFFINER" UNFALLTYPEN IN DER BUNDESREPUBLIK DEUTSCHLAND UND IN DEN BUNDESLANDERN VON 1966 BIS 1970 (THE DEVELOPMENT OF ALCOHOL ACCIDENTS UNDER SPECIAL CLASSIFICATION OF "ALCOHOL-RELATED" ACCIDENT TYPES IN THE FEDERAL REPUBLIC OF GERMANY AND IN THE FEDERAL TERRITORY FROM 1966 TO 1970)

Accidents occurring on roads in West Germany are examined and classified into types. The accidents involving personal in-

juries from 1966 to 1970 are analyzed. A combination of factors is described statistically, with emphasis given to the analysis of background conditions in relation to drinking drivers. The results are illustrated in several tables.

by H. D. Utzelmann
Publ: BLUTALKOHOL v11 n4 p217-39 (Jul 1974)
1974 ; 13refs
Text in German. English summary.
Availability: See publication

HS-016 075

UBER DIE GENAUIGKEIT DES ALKOHOLNACHWEISES IN HARNEN NACH DEM VANADIN-SCHWEFELSAURE-VERFAHREN (ON THE ACCURACY OF THE EVIDENCE OF ALCOHOL IN URINE AFTER THE VANADIUM-SULFURIC ACID TREATMENT)

Blood alcohol concentrations (BACs) are compared in drivers before and after enactment of a West German law regarding allowable alcohol limits. The total number of blood samples ordered by the police remained constant in the periods compared, although initially a decrease followed by an increase was noticed. It was not possible to prove statistically significant shifts in the BACs, but the accidents caused by road users under the influence of alcohol decreased, evidently as a consequence of more frequent routine controls by police.

by P. H. Kreutzer
Publ: BLUTALKOHOL v11 n4 p240-7 (Jul 1974)
1974 ; 9refs
Text in German. English summary.
Availability: See publication

HS-016 076

DIE UNTERSUCHUNG KRAFTFAHRWESENTLICHER LEISTUNGSMINDERUNGEN DURCH ARZNEIMITTEL (THE INVESTIGATION OF SUBSTANTIAL TRAFFIC PERFORMANCE DIMINUTION WHILE UNDER INFLUENCE OF DRUGS)

The tranquilizer prazepam was used to study the effects of drugs on the driving performance of 80 subjects. They were given normal dosages for three days, and double dosages for the next two days. In one of the test series, test persons were given alcohol in addition to the medicine. The dosage was 0.75 grams of alcohol per kilogram of weight (approximately 0.80% blood alcohol concentration). The expected differential results from the prazepam experiment indicate that the method applied is a good means to obtain meaningful and reliable information economically on the effects of medicine on the intellectual and psychomotor functions which are essential for driving. However, the effects of drugs differ depending on age, sex, personality, constitution, and condition.

by L. Moser
Publ: BLUTALKOHOL v11 n5 p285-311 (Sep 1974)
1974 ; 56refs
Text in German. English summary.
Availability: See publication

HS-016 077

Part of a criminological research study on drugs and delinquency is presented. Intensive interviews with young drug addicts show that young drug users often drive motor vehicles under the influence of drugs when their faculties are impaired. Typical cases of dangerous situations and behaviors are shown. The correlation of traffic offenses and drug use is almost entirely undetected by the police.

Publ: STRASSENVERKEHRSDELINQUENZ IM ZUSAMMENHANG MIT DROGENMISSBRAUCH (STREET TRAFFIC DELINQUENCY IN CONNECTION WITH DRUG ABUSE)
1974
Text in German. English summary.
Availability: See publication

HS-016 078

UNTERSUCHUNGEN UBER DIE HOHE DES BLUTALKOHOLGEHALTES IM ZEITPUNKT DER BLUTENTNAHME BEI VERDACHT DER TRUNKENHEIT AM LENKRAD NACH INKRAFTTRETEN DES "0,8-PROMILLEGESETZES" (EXAMINATION OF THE VOLUME OF BLOOD ALCOHOL CONTENT AT THE TIME BLOOD IS WITHDRAWN FOR SUSPICION OF DRUNKENNESS AT THE WHEEL AFTER THE "0.8-PER MILLE-LAW" WENT INTO EFFECT)

A comparison of three three-month time segments shows that in the first nine months after the West German "0.80 per mille law" went into effect, no decrease but rather a slight increase in the number of police-determined cases of suspected driver intoxication was observed. The slight rise is due to the increase of drunkenness-without-accident cases. Before the "0.80 per mille law" went into effect and before the German High Court decision of December, 1973, approximately 35-40% of suspected cases of drunkenness at the wheel were complicated by the problem of retrospective calculations: the estimation of the minimum value at the scene. This proportion now amounts to only about 10%.

by W. Naeve
Publ: BLUTALKOHOL v11 n6 p413-20 (Nov 1974)
1974
Text in German. English summary.
Availability: See publication

HS-016 079

THE TRI-LEVEL APPROACH TO CRASH INVESTIGATION

Literature on multi-level crash investigation and reporting is reviewed, and crash investigation activities in Australia are examined. A method is suggested for utilizing the multi-level concept in the Australian context. Three multi-level studies carried out in the U.S.A. are briefly described and the results commented on. These are the Calspan Corporation study of the eight western counties of New York State, the Indiana University Institute for Research in Public Safety study of Monroe County, Indiana, and the University of Michigan Highway Safety Research Institute study of Washtenaw County, Michigan. Elements of a multi-level study are identified and the essential requirements restated. The crash experience

of semitrailers is used as an illustration of how data from level 1 of a multi-level study can be used to determine instances of high crash frequency needing closer examination. Tables show crash and injury involvement by type of vehicle for the state of Victoria, Australia, in 1971.

by G. A. Ryan
Monash Univ. Medical School, Dept. of Social and Preventive Medicine, Vic., Australia
Rept. No. Paper-9 ; 1974 ; 22p 22refs
Presented at the Road Accident Information Seminar, Canberra, Australia, 26-28 Mar 1974.
Availability: Corporate author

HS-016 080

HOW COMPLETE ARE DRIVER RECORDS? AN ANALYSIS BASED ON INSURANCE CLAIM CRASHES

The completeness of official driver records is examined in terms of reportable and nonreportable crashes, and the extent of reporting biases with regard to driver and/or crash characteristics. The sample consisted of 992 insurance claims based on crashes involving North Carolina drivers between July, 1969 and June, 1970. Of the 992 claims, 810 of the accidents should have appeared on the official driver records, but only 84.6% did. Examination of 76 nonreportable crashes showed only one significant finding with regard to reporting bias: single vehicle crashes were more likely to be recorded than multiple vehicle crashes. For the 810 reportable crashes, these recording biases were noted: drivers under 25 had the highest percentage of their crashes recorded, and those over 44 had the lowest; drivers without valid North Carolina licenses but who have entries on their driving record had an especially low percentage of their crashes recorded; the more serious the reported injury, the more likely the crash was to be recorded; the greater the number of persons injured, the more likely the crash was to be recorded; rural crashes were more likely to be recorded than urban crashes; and drivers with no crash on their driving record in the prior year were more likely to have their crashes recorded than drivers with at least one crash. A descriptive analysis examining interactions of four variables, driver age, crash location, crash severity, and presence or absence of previous recorded crashes, indicated that drivers with no recorded crash the previous year who were involved in a serious crash or minor injury rural crash had high recording rates. Four groups of drivers had exceptionally low recording rates. All consisted of drivers over 44 involved in an urban crash, and three of these represented drivers with at least one recorded crash the previous year. It is concluded that the North Carolina driver file may be fairly complete in terms of reportable crashes. Certain biases in recording are indicated, which should be considered when using driver records as a data base, or interpreting results based on data from this source.

by E. G. House; P. F. Waller; G. G. Koch
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N. C.
1974 ; 48p 6refs
Sponsored in part by the N. C. Governor's Hwy. Safety Program.
Availability: Corporate author

HS-016 081

TOWARD MORE EFFECTIVE HEADLIGHTING

Four years of research on headlighting are discussed, including development of a computer simulation technique for evaluating the performance of present and experimental headlamp systems and beams. The problem of misaimed headlamps is considered in terms of factory aiming, service trade aiming, misaiming as a function of normal use, aiming devices, and vehicle loading. A three-beam system and design concepts for its controls are examined. In the development of a computer simulation, elements of the mathematical model are described along with the field tests for its validation. After assessment of the results of the computer simulations and previous studies, it is concluded that unless current problems of beam misaim can be solved, new beams with higher intensities or different illumination patterns will not produce significantly safer or more comfortable nighttime driving conditions.

by J. E. Haney
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48105
Rept. No. UM-HSRI-RI-74-2 ; 1974 ; 29p 9refs
Sponsored by the Motor Vehicle Mfrs. Association.
Availability: Corporate author

HS-016 082

ARE WE BEING OVER-REGULATED AND UNDER-PROTECTED?

The practicality of some safety efforts is questioned by a trucking executive who fears they might increase rather than reduce hazards. It is suggested that safety engineers avoid approaches that over-emphasize one part of the problem and under-emphasize another part. Bureaucratic red tape and regulatory requirements prevent safety needs from being handled in priority order. Some of the problems examined deal with: driver licensing, driver education, vehicle requirements, privacy legislation and equal opportunity, research, and law enforcement. It is concluded that the impact of emotion on safety must be countered, and that all of safety activity must have proper justification.

by R. H. Shertz
Publ: TRAFFIC SAFETY v75 n1 p6-8, 38 (Jan 1975)
1975
Availability: See publication

HS-016 083

THE YELLOW BOOK ROAD: THE FAILURE OF AMERICA'S ROADSIDE SAFETY PROGRAM

Based primarily on interviews with over 100 state and federal highway officials and inspection of the new federal-aid routes in eight states, the study documents that roadside hazards are being built on the newest highways and shows how the administration of the Federal-Aid Highway Program ensures this continued safety failure. The role of AASHTO is analyzed, along with the lack of mandatory design standards, the federal and state failure to train personnel in roadside safety principles, the relationship of the Trust Fund to roadside safety, the inadequacy of present safety research, the failure of the Highway Safety Program, and the probable effect of Certifica-

tion Acceptance to further undermine roadside safety. A major overhaul of the Federal-Aid Highway Program is recommended, including the establishment of a separate DOT agency to develop and enforce mandatory roadside performance standards for all Federal-aid highways.

by E. Miller; A. Delibert; L. Smith
Center for Auto Safety, 1223 Dupont Circle Bldg., Washington, D.C. 20036
1974 ; 309p refs
Supported by the State Farm Companies Foundation.
Availability: Corporate author

HS-016 084

MARIHUANA AND HEALTH. FOURTH ANNUAL REPORT TO THE CONGRESS FROM THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE

A study of marijuana and health focuses on the extent and nature of its use, preclinical research, preclinical behavioral effects, effects in man, and therapeutic aspects. Present patterns and changes in use are shown, along with social and psychological influences, especially on students. Research related to chemistry and metabolism, toxicological and pharmacological effects is reviewed. Preclinical behavioral effects are described, including: unlearned behavior (activity, exploration, and motor tasks); consummatory behavior; aggressive behavior, dominance and competition; avoidance learning and aversive control; reinforcement schedules and maze learning; discrimination learning; and tolerances. Acute and chronic effects of cannabis in man are discussed, including effects on driving performance (both motor and mental), on chromosomes and reproductive processes, and psychopathology.

National Inst. on Drug Abuse, 11400 Rockville Pike, Rockville, Md. 20852
1974 ; 158p 437refs
Availability: GPO $2.25

HS-016 085

MOTOR CARRIER ACCIDENT INVESTIGATION. GREYHOUND LINES, INC. AND N.A.B. TRUCKING CO., INC. ACCIDENT--MAY 11, 1974--CHARLESTON, MISSOURI

The collision between a passenger bus and semitrailer which involved seven fatalities, 43 injuries, and $15,000 property damage is described. The bus failed to negotiate a curve, ran off the right side of the road, collided with an overturned trailer off the roadway, and came to rest upright in a ditch. The cause of the accident was determined to be excessive speed on the part of the bus driver, and a failure to heed warning signs. It is shown that the bus driver did not exercise extreme caution on the approach to a construction zone and was evidently not aware that an original detour had been relocated. The change in the road pattern is mentioned as a contributing factor to the accident. The detour area was relocated but no additional warning signs were placed in the area to forewarn motorists of the change.

Bureau of Motor Carrier Safety, Washington, D. C.
Rept. No. BMCS-74-1 ; 1974 ; 14p
Availability: Corporate author

HS-016 086

HIGHWAY AND URBAN MASS TRANSPORTATION

Programs and activities relating to highway and urban mass transportation are reported and illustrated. Separate articles are included on each topic: national energy conservation; higher vehicle occupancy to ease traffic density; mobility for the disadvantaged; contract award for a prototype of an advanced concept train; the visual quality of highways; new procedures for protection of the historic environment; a photography contest and exhibit featuring the highway and its environment; the Johnny Horizon program adopted by DOT for public awareness of environmental concerns; the DOT bicycle program; financing bikeways and walkways through federal-aid highway funds; methods of financing federal-aid highways; and accident investigation in 1972.

Urban Mass Transp. Administration, Washington, D. C.
1974 ; 34p
Availability: GPO $1.00

HS-016 087

ANALYSIS OF ACCIDENT REPORTS INVOLVING FIRE, 1972

Statistics from 692 reports submitted by for-hire motor carriers are presented which indicate that fire was involved in the accident. The Statistical tables contain a variety of data, including: month of the accidents' occurrence, type of units involved, the types of accidents, the locations and causes of fire, mechanical defects found, and commodity classification. The data are divided into two sections, for property carriers and passenger carriers or buses. Although the 692 accidents indicate that only 1.07% of all carrier accidents involve fire, they also involve 6.23% of all fatalities for the year, 1.31% of the injuries, and 6.45% of the property damage.

Bureau of Motor Carrier Safety, Washington, D. C.
1974 ; 20p
Availability: Corporate author

HS-016 088

INITIAL PERFORMANCE OF SUPPORTED NITROGEN OXIDES REDUCTION CATALYSTS IN A DUAL-CATALYST SYSTEM

The initial nitrogen oxides (NOx) reduction activity of several alumina-supported, platinum-group metal catalysts is evaluated in vehicle tests. The experimental vehicle was equipped with two 36 cubic inch NOx converters, and a 260 cubic inch oxidation converter containing a pelleted platinum catalyst, rich carburetion, and exhaust gas recirculation. The NOx catalysts included ruthenium, ruthenium-platinum, ruthenium-palladium, mechanical mixtures of ruthenium and platinum, platinum-nickel, platinum, and palladium. As evaluated over the 1975 FTP, the NOx reducing effectiveness of these catalysts was: ruthenium combinations are greater than platinum-nickel which is greater than platinum, which is approximately equal to palladium. Modulated air injection was used, enabling the NOx converters to be used as oxidizing converters during vehicle start-up. Operation in this mode greatly reduced hydrocarbon and carbon monoxide emissions, with an acceptable increase in NOx emissions. In addition, the NOx reduction performance of all the NOx catalysts was enhanced by bleeding a

small amount of air into the NOx converters. Minimum NOx emissions corresponded to air bleed rates of 3-4% of the total engine airflow. The air bleed effect was due to decreased NH-3 formation over ruthenium, and to increased NOx activity due to higher catalysts temperatures over platinum.

by G. J. Barnes; R. L. Klimisch
General Motors Res. Labs., Warren, Mich.
Rept. No. SAE-740251 ; 1974 ; 12p 8refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.
Availability: SAE

HS-016 089

A MATHEMATICAL STUDY OF THE EFFECT OF NECK PHYSICAL PARAMETERS ON INJURY SUSCEPTIBILITY

Analytical man motion models have been used to study how basic physical measurements may relate to susceptibility to cervical hyperextension-hyperflexion injury in an automobile collision. The parameters considered in the computer study are head-neck mass and moments of inertia, anthropometry, neck muscle strength, and location, as well as strength of motion-limiting stops. In addition, related environmental parameters such as seat structural properties and crash acceleration pulse are included. The data used with the computer program span the range of physical and sexual variation in function and structure of the neck in a representative U.S. population and have been obtained in an extensive experimental program. Results are presented which attempt to relate injury susceptibility to physical stature, age, and sex.

by D. H. Robbins; R. G. Snyder; D. B. Chaffin; D. R. Foust
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich.
Rept. No. SAE-740274 ; 1974 ; 32p 5refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974. Sponsored by the Insurance Inst. for Hwy. Safety, Washington, D. C.
Availability: SAE

HS-016 090

ASSURING PUBLIC HEALTH PROTECTION AS A RESULT OF THE MOBILE SOURCE EMISSIONS CONTROL PROGRAM

Provisions of the Clean Air Act Amendments are explained. Carbon monoxide, hydrocarbons, and oxides of nitrogen are specifically regulated emissions; fuels, fuel additives, and lubricants can be regulated, and many nonregulated emissions can be regulated on need. In examining these three categories of pollutants, the paper describes the health consequences of regulated and nonregulated emissions, the effects of various components on nonregulated emissions, and the effect of advanced control systems on regulated and nonregulated emissions. Current EPA research on fuel and fuel additive registration, emissions characterization, health, and surveillance is discussed.

by J. B. Moran
Environmental Protection Agency, Washington, D. C.
Rept. No. SAE-740285 ; 1974 ; 13p 12refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.
Availability: SAE

HS-016 091

TESTS OF CURRENT AND EXPERIMENTAL CHILD RESTRAINT SYSTEMS

The protection potential offered by various production and prototype child restraint systems is investigated. Parameters of child seat performance are determined which are relevant to injury prevention. A detailed discussion of these parameters is given. The dynamic performance of 10 child auto-car seats, two harnesses, and three infant restraint systems are discussed. The head excursion, head and chest accelerations, and overall system performance are presented. It was found that head excursion in the rear impacts, and to a lesser extend in the front impacts, was due in part to deflection of the adult car seat back, which allowed the child restraint systems to travel further than they would have, had the seat backs been more rigid.

by R. L. Stalnaker
University of Michigan, Hwy. Safety Res. Inst., Ann Arbor, Mich. 48105
Rept. No. SAE-740045 ; 1974 ; 27p 13refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.
Availability: SAE

HS-016 092

COLD WEATHER DRIVEABILITY PERFORMANCE OF LATE MODEL CARS

The results of a low-temperature program to investigate the drivability performance of 10 1973 U.S. vehicles and to determine the effect on performance of changes in gasoline volatility are presented. It is noted that gasoline volatility modifications are needed to minimize the impact of engine design changes, required for lowering exhaust gas emissions, on drivability. Drivability performance was affected much more by engine design variables than by changes in fuel volatility. In cold start and driveaway operation, some cars performed well on all fuels at all temperatures. Others gave poor performance on most fuels at all temperatures, with hesitation, stumble, stall on acceleration and stall immediately after start-up being most prevalent problems. During warm operation, the primary malfunction noted was surge which varied widely among the 10 cars tested and was unrelated to fuel volatility. In several cars, warm operation problems approached or exceeded those found in cold start and driveaway operation.

by A. M. Horowitz; W. L. Wascher
Mobil Res. and Devel. Corp., New York
Rept. No. SAE-740520 ; 1974 ; 19p 5refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 093

PASSENGER CAR DRIVABILITY IN HOT WEATHER

During the fall of 1971, the Coordinating Research Council conducted a test program at Yuma, Arizona, to investigate a drivability test procedure and the effects of fuel volatility on driveability during hot weather (90-100° F). The procedure included evaluation of vapor lock, hot start and run, and traffic driveaway. In phase 1, 12 late-model automobiles and two fuel series were evaluated. In phase 2, four cars and four raters

were used to evaluate repeatability and reproducibility. Traffic driveaway of individual cars was related to fuel volatility but could not be defined by a general volatility factor for all vehicles. Vapor lock, as in the past, was related to front-end volatility. A usable procedure was demonstrated, but it was shown that for traffic driveaway, the influence of the rater should be reduced.

by R. M. Reuter; J. E. Robinson
Texaco, Inc., New York; Standard Oil Co. (Ohio), Cleveland
Rept. No. SAE-740521 ; 1974 ; 24p 8refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974. Sponsored by the Coordinating Res. Council.
Availability: SAE

HS-016 094

NEW MULTIGRADE SE/CD LUBRICANT

A new 20W-40 multigrade oil that meets SE/CD specifications is described which promises to perform satisfactorily in both gasoline and heavy-duty diesel engines. It permits easy cold starts, and it has passed the Caterpillar Tractor Co. OL-1 and the Mack T-1 tests and all of the SE/CD test requirements. Comprising a low-viscosity base stock blended with a V. I. improver and an improved detergent-inhibitor additive package that minimizes ring sticking, this oil is probably the forerunner of a series of SE/CD oils with even wider crossgradings.

by R. E. Kay; J. A. O'Brien
Amoco Chemicals Corp.
Rept. No. SAE-740523 ; 1974 ; 8p 4refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 095

ALL-YEAR COMMERCIAL OILS

A method based on apparent viscosity of engine oils at 0° F measured by the cold cranking simulator to estimate minimum starting temperatures for SAE "W" numbered engine oils is described. Based on apparent viscosity measurements, a nonpolymer-containing SAE 20W-30 engine oil would satisfy 100% of gasoline or diesel engine powered fleets where temperatures are consistently above 0° F. Based on climate and vehicle distribution by geographical location, about 15% of gasoline engine powered vehicles require engine oils with low-temperature properties found in SAE 5W or SAE 10W engine oils. Diesel engines using a nonpolymer containing SAE 20W-30 engine oil would obtain the benefits of SAE 20W low-temperature starting properties and SAE 30 high-temperature protection. Initial field tests of gasoline-powered vehicles in severe winter service indicate adequate low-temperature properties for a nonpolymer-containing SAE 20W-30 engine oil compared to an SAE 20W-20 grade normally used in this application in winter. This method may also be used to compare low-temperature properties of engine oils containing different V.I. improvers.

by T.R. Mullen; W. J. Lendener; M. J. Frino
Cities Service Oil Co.
Rept. No. SAE-740524 ; 1974 ; 9p 11refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 096

DIESEL ENGINE OIL CONSUMPTION STUDIES

An oil consumption test procedure has been developed in a six cylinder, 425 hp, turbocharged and after-cooled diesel engine. Tests conducted on reference oils agree with good and poor oil consumption characteristics found with these same oils in the field. This paper includes evaluations using the engine test procedure as well as various laboratory bench tests which measure the effects of viscosity, volatility, and oxidation stability. Both bench and engine test results indicate that traditional properties, such as viscosity and volatility, do not completely account for variations in oil consumption. The data indicate that the problem of obtaining low diesel engine oil consumption may involve a complex combination of factors.

by W. C. Gergel; J. E. Riester
Lubrizol Corp., Cleveland, Ohio
Rept. No. SAE-740525 ; 1974 ; 21p 18refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 097

FUEL ECONOMY AND COLD-START DRIVABILITY WITH SOME RECENT-MODEL CARS

In view of the deterioration in fuel economy and driveability as a result of engine changes made to reduce exhaust emissions in recent-model cars, chassis dynamometer tests were run with 1970 and 1972 cars using both cold-start and hot-start procedures. Fuel economy and drivability were evaluated during the first two miles and the last three miles of a 50° F cold-start driving cycle similar to the Coordinating Research Council road test. Fuel economy was also evaluated under warmed-up conditions at 72° F using the last half of the cold-start cycle. The effects of car year model, gasoline volatility, gasoline heat content, and car warmup are discussed.

by J. C. Ingamells
Chevron Res. Co.
Rept. No. SAE-740522 ; 1974 ; 12p 7refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974. Prepared in cooperation with the Coordinating Res. Council.
Availability: SAE

HS-016 098

THE PREDICTION OF DRIVING RECORD FOLLOWING DRIVER IMPROVEMENT CONTACTS. FINAL REPORT

The post-contact driving records of 13,594 male negligent operators (NO's) were predicted using three data sources: prior driving record, NO's questionnaire responses, and interview information supplied by Driver Improvement Analysts (DIAs). NOs attending group meetings and individual hearings filled out two questionnaires, one which elicited factual data and another which requested NOs to report their feelings. After each hearing, DIA made a prediction about NO's probability of improvement and completed a questionnaire. Equations predicting post-contact accidents and convictions were constructed, based on stepwise, multiple regression analyses using half of the sample. Of the accident prediction equations, only the one based solely on prior driver record variables suc-

cessfully cross-validated. Equations using variables from all three data sources predicted convictions in the cross-validation sample, and two out of the three conviction equations also predicted cross-validation accidents. No significant improvement in accuracy of prediction was made by tailoring equations to different contact groups in the construct sample. DIA'S, in general, could not predict accidents, although there was slight evidence that a few DIA'S could. In contrast, most DIA'S were able to predict convictions to a limited degree. The results concerning DIA prediction were not cross-validated. Pertinent research from clinical psychology and driver behavior disciplines was reviewed.

by W. C. Marsh; D. E. Hubert
California Dept. of Motor Vehicles, Res. and Statistics Sec., P. O. Box 1828, Sacramento, Calif. 95809
Contract FHWA-HPR-PR-1-(10)-B0141; IA-13406
Rept. No. CAL-DMV-RSS-74-50 ; 1974 ; 143p 44refs
Sponsored by the Calif. Div. of Hwys., Sacramento.
Availability: Corporate author

HS-016 099

AUTOMOBILE ACCIDENT COSTS AND PAYMENTS. STUDIES IN THE ECONOMICS OF INJURY REPARATION

The book is divided into three parts: injury reparation in the United States; the Michigan Automobile Injury Survey; and foreign systems of reparation for automobile injuries. American systems of reparation for injury, illness, and death are reviewed, with details given on their functions. Methods of estimating the social value of a reparation system are discussed, with particular emphasis on automobile injury reparation. In the Michigan study, details are offered on the serious injury cases, tort settlements, auto injury cases in the courts, attitudes and opinions of claimants and defendants, and a description and evaluation of the survey methods. Systems of reparation for injuries in England, Sweden, France, and West Germany are reviewed. Appendices are included on the reliability of sample estimates and the Injured Person's Questionnaire.

by A. E. Conard; J. N. Morgan; R. W. Pratt, Jr.; C. E. Voltz; R. L. Bombaugh
University of Michigan
1964 ; 532p refs
Supported by the William W. Cook Endowment for Legal Res. and the Walter E. Meyer Res. Inst. of Law, Inc.
Availability: University of Michigan Press, Ann Arbor, Mich.

HS-016 100

PREDICTING TRUCK JACK-KNIFE WHILE BRAKING WITH ONLY THE TRACTOR EQUIPPED WITH ANTI-SKID SYSTEM

Cases are described which support the idea that a truck having an anti-lock system only on the tractor is more unstable than an efficient driver pumping the brakes. The tractor can maintain its heading in a "tractor only" scheme, but trailer the is free to swing. If a driver learned to rely on the anti-skid system of the tractor, he could lose his "pumping" skill and be at more of a disadvantage than applying that skill in a conventional braking system. Steering and forward displacement diagrams are included. An appendix details a computer simulation model for determining the dynamic behavior of tractor semitrailer vehicles when anti-skid braking systems are employed. The mathematical models used to represent the brake system, anti-skid controller, tire mechanics, and three-dimensional vehicle dynamics are developed. The examples presented demonstrate the capability and potential of the simulation model for anti-skid brake system evaluation. Absolute magnitude of results obtained from the simulation would be highly dependent upon representation of actual tire and road surface properties by the tire mechanics model.

by T. R. Comstock; V. T. Nicolas
University of Cincinnati, Mechanical Engineering Dept.
1974 ; 28p 10refs
Prepared for E. I. duPont Co., Wilmington, Del. The authors' ASME publication entitled "Predicting Directional Behavior of Tractor Semitrailers When Wheel Anti-Skid Brake Systems Are Used" is included.
Availability: Corporate author

HS-016 101

THE SEAT BELT ARGUMENT (POURQUOI LES CEINTURES DE SECURITE?)

Current data on seat belts are reviewed, with emphasis on seat belt effectiveness, seat belt usage, and approaches to increasing seat belt wearing. It is shown that seat belts are effective, and that all evidence indicates belts reduce death and injury in traffic accidents. Approaches to influencing voluntary use include public education and mechanical methods such as lights and buzzers. Seat belt usage laws are reviewed, and issues relating to them are discussed, including: public education, convenience, enforcement, infringement on individual rights, effect of non-use on compensation for injuries, and the substance of the law. An annotated bibliography is given along with a summary of seat belt facts in two appendices.

Ministry of Transport, Ottawa, Ont., Canada
Rept. No. CTS-4-74 ; 1974 ; 67p refs
Text also in French.
Availability: Countermeasures Devel., Road and Motor Vehicle Traf. Safety, Ministry of Transport, Ottawa, Ont., Canada $0.75

HS-016 102

EFFECTIVENESS OF TRAFFIC LAW ENFORCEMENT

The effects of varying levels of police enforcement on driver behavior and safety at urban intersections are examined. The study utilizes results of a previous study on intersection accident prediction. Definitive results were not produced, but several significant findings are discussed. At half the intersections studied, the increased police enforcement was shown to have a significant effect on driver behavior which exhibited changes less characteristic of a learning process than an immediate and short-lived reaction to obvious police presence. While the data did not yield solid evidence to link these behavioral changes directly to probable accident reductions, it appeared that the types of driving behavior most likely to lead to conflicts and accidents were affected less by enforcement than were the more innocuous categories of violations. The results indicate that while short-term benefits can be achieved from enforcement level increases, the law of diminishing returns may be operative in that the most significant effects

are likely to result from initial increases at low surveillance level locations with further increases producing little additional benefit.

by P. J. Cooper
Ministry of Transport, Ottawa, Ont., Canada
Rept. No. CTS-6-74 ; 1974 ; 129p 9refs
Availability: Road and Moto: Vehicle Traf. Safety, Ministry of Transport, Ottawa, Ont., Canada

HS-016 103

VISION: ITS ROLE IN DRIVER LICENSING

Efficient and properly used vision is discussed in order to improve the understanding of vision screening procedures in driver licensing. The driving task is first examined, with emphasis on factors which affect vision, such as age, intoxicants, glare, speed, and drugs. Common vision related conditions are considered, including: myopia, hyperopia, astigmatism, presbyopia, one-eye, cataracts, crossed eyes, unbalanced vision, and other problems. Correction of refractive states by glasses or contact lenses is described. Administration procedures for vision screening are given, including equipment needs, public information, coordination with vision specialists, and the role of the examiner. Screening evaluations are detailed for visual acuity, depth perception, field of vision, eye coordination, color perception, luminance contrast, and dynamic visual acuity. Factors affecting screening results include lighting, illumination chart, head/eye positioning in the instrument, interpupillary distance, applicants wearing lenses, memorization, contrast, and distance. AAMVA recommended standards are presented, and specifics relating to the role of the vision specialist are noted.

by G. M. Milkie, ed.
American Optometric Assoc., St. Louis, Mo.; American Assoc. of Motor Vehicle Administrators, Washington, D. C.
1974 ; 60p 103refs
Availability: American Optometric Assoc., 7000 Chippewa St., St. Louis, Mo. 63119

HS-016 104

GUIDE FOR PHYSICIANS IN DETERMINING FITNESS TO DRIVE A MOTOR VEHICLE

Recommendations of the Canadian Medical Association are offered to assist physicians in determining the ability of their patients to drive a motor vehicle safely and in completing a Driver's Medical Examination Report. Various aspects of the physician's role are reviewed along with descriptions of license restrictions, standards of medical fitness, classes of licenses, appeals, and modification of medical standards. Complete details are given for examination of: vision, hearing, cardiovascular diseases, cerebro-vascular disease, peripheral vascular disease, diseases of the nervous system, respiratory diseases, metabolic diseases, renal disease, musculoskeletal disabilities, psychiatric disease, the effect of drugs and alcohol, the aging driver, and anesthesia and surgery effects.

by W. R. Ghent; J. S. Bennett; R. N. Green; G. A. Jackson; N. H. McNally; G. D. McPherson; A. W. F. Peart; P. N. Ransford
Canadian Medical Assoc., 1867 Alta Vista Dr., Ottawa, Ont., Canada K1G0G8
1974 ; 50p
Availability: Canadian Medical Assoc. Communication Dept., 1867 Alta Vista Dr., Ottawa, Ont., Canada $0.50

HS-016 105

INVESTIGATION OF SEAT BELT PERFORMANCE IN NEW SOUTH WALES TRAFFIC CRASHES

Objectives, techniques, and problems of in-depth studies of the performance of adult restraint systems in traffic crashes are discussed. The New South Wales project, Impact-1, is detailed, with briefer descriptions given of Impact-3 and some planning considerations of Impact-2. The broad aim of Impact-1 is to identify those factors which at present limit the effectiveness of seat belt restraint systems. Crashes studied were those in which at least one adult occupant of a 1969 or later model car was fatally injured while wearing a seat belt and the crash occurred within a 250 mile radius of Sydney, Australia. Consideration is given to crash investigation criteria; data sought and resources available; investigation procedures such as notification, field investigation, and medical data; integration of data with other information; problem areas; and project timetables. Impact-1 is expected to cover a total of about 150 crashes. The broad aim of Impact-3 is to establish the relative benefits of alternative restraint systems for child occupants by establishing details of the system used, damage severities, and child injuries in traffic crashes. Multidisciplinary teams are used for both projects. It is concluded that in a situation where the proportion of passenger vehicle occupants wearing seat belts is high, those who are killed or injured while wearing belts comprise a group of special importance, because, if vehicle occupant casualties are to be further reduced, the reduction must come from this group. Injury data related to seat belt wearing, an accident report form, distribution of delays between fatalities and their investigation, number of fatalities notified per week, a list of equipment used by the Impact-1 field team, and detailed instructions for photographing vehicle damage are included.

by R. G. Vaughan
Department of Motor Transport, Traffic Accident Res. Unit, Sydney, N.S.W., Australia 2001
Rept. No. 6/74 ; 1974 ; 27p 12refs
Slightly amended version of Paper 13 (HS-015 991) presented at the Road Accident Information Seminar, Expert Group on Road Safety, Canberra, 26-28 Mar 1974.
Availability: Traffic Accident Res. Unit, Dept. of Motor Transport, Box 28 G.P.O., Sydney, New South Wales 2001 Australia

HS-016 106

BRAKE FRICTION-MATERIAL WEAR AS A STOCHASTIC PROCESS

An empirical equation is discussed that can be used to describe friction material wear, the values for which may be determined by dynamometer testing. By means of this equation, it is possible in principle to predict friction-material life for various driving situations such as: Detroit traffic, Los Angeles traffic, and intercity-freeway travel. Typical frequencies, durations, and intensities of brake application for a given situation are recorded in actual driving tests, and the statistical distributions of these variables are determined. Braking can then be treated as a stochastic process, and the wear effects of each application can be calculated.

by W. M. Spurgeon; S. K. Rhee; M. G. Jacko
Publ: BENDIX TECHNICAL JOURNAL v6 n2 p9-17, 25 (Winter 1973/74)
1974 ; 28refs
Availability: See publication

HS-016 107

BRAKING- AND ACTUATION-SYSTEM CONCEPTS FOR PASSENGER-CAR/TRAILER COMBINATIONS

Present-day brake systems are evaluated and design requirements are determined for systems capable of meeting future needs at a cost commensurate with performance. Systems analysis is used to establish dynamic axle loads, and optimized brake balances are derived. The relative complexities and advantages of electric, pneumatic, and hydraulic actuation systems are discussed, and extension of the power source to other functions is examined. Anticipated performances for several system concepts are compared, and some predictions are made with respect to future market potential. Focus is on recreational and towed vehicles.

by D. W. Howard; M. E. Gatt
Publ: BENDIX TECHNICAL JOURNAL v6 n2 p35-46 (Winter 1973/74)
1974
Availability: See publication

HS-016 108

LINEAR ANALYSIS OF A HYDRAULIC BRAKE BOOSTER

A linear analysis of an open-center hydraulic brake booster is described that has no dependence on engine vacuum and is compatible with the higher pressure and larger displacement requirements of advanced brake systems. To perform the analysis, physical and mathematical models of the booster (from the brake-pedal input to the interface between the booster and the foundation-brake system) were derived, and the critical parameters were determined. Specialized digital computer programs were then used to examine the booster stability margin, and modification designed to improve booster stability were evaluated. An overview of the analysis is presented, and certain of the evaluation results are discussed, including those of the release mode and build mode.

by R. T. Hendrickson
Publ: BENDIX TECHNICAL JOURNAL v6 n2 p47-54, 64 (Winter 1973/74)
1974 ; 4refs
Availability: See publication

HS-016 109

DESIGN AND ANALYSIS OF A SOLENOID/POWER-BOOST BRAKE SYSTEM

A feasibility study conducted on a unique design is described in which a solenoid is coupled with a standard passenger car vacuum booster. To keep production costs as low as possible, the design is open-loop in form and incorporates only production-line components. Static instability problems were solved by analyzing both solenoid and booster operation. The solenoid requires a 12-volt three-ampere electrical supply and weighs 3.5 lbs (1.6 kg). The system represents a practical approach to the hydraulic braking of trailers in combination vehicles. It is noted that the basic solenoid/booster combination has other potential applications. Because a pedal could easily be added to the system, it could be installed in a passenger vehicle to provide, in addition to manual braking, an automatic braking capability, the solenoid perhaps being actuated by a radar sensor.

by A. E. Sisson
Publ: BENDIX TECHNICAL JOURNAL v6 n2 p60-4 (Winter 1973/74)
1974 ; 1ref
Availability: See publication

HS-016 110

THE DOT BICYCLE PROGRAM

The role of DOT in facilitating bicycle use is discussed. Emphasis is directed toward public safety and elimination of bicycling hazards. Three aspects of the safety problem are described: the bikeway, bicycle riding performance, and the design and performance of the vehicle. The Federal role is examined in terms of research and development plans of both the Urban Mass Transportation and Federal Highway Administrations as well as NHTSA in instituting special bicycle education programs and by making available funding and technical assistance. The status of various bicycle trails in the Netherlands, California, and Florida is reviewed. FHWA development of a guide to provide the basic information necessary for highway planners to consider in planning bicycle facilities is described, along with a second project to study automobile/bicycle traffic conflicts at intersections. NHTSA activities relating to study of accident causes, traffic safety programs, safety education, and bicycle traffic regulations are also reviewed.

by S. Charnovitz
Department of Transportation, Office of Environmental Affairs
Publ: HIGHWAY AND URBAN MASS TRANSPORTATION p24-9 (Sep 1974)
1974
Availability: See publication

HS-016 111

EFFECT OF IMPOSED FAULTS ON A DISTRIBUTOR INJECTION SYSTEM

The effects of several faults on different parameters in a distributor injection system are studied both theoretically and experimentally. The faults imposed on a healthy system are: fuel leaks between the pump and injector, improper adjustment of the injector opening pressure, a broken or missing injector spring, plugged nozzle holes, and a stuck-closed needle. The injector parameters examined include maximum fuel pressures reached at different locations in the system, needle lift, injection lag, and injection rate.

by N. A. Henein; T. Singh
Wayne State Univ., Detroit, Mich.
Contract DAAE07-72-C-0250; DAAE07-74-C-0018
Rept. No. SAE-740531 ; 1974 ; 14p 2refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 112

APPLICATION OF AUTOMATIC TEST EQUIPMENT TO BUS MAINTENANCE

A system for built-in instrumentation, applied to a fleet of bus vehicles, is evaluated as one element of a continuing program to improve the effectiveness and efficiency of bus maintenance operations. The evaluation study concentrated on a built-in instrumentation system, originally developed for military vehicles, in which the connections, sensors, and transducers required for test and diagnosis are permanently installed on a0vehicle and terminated in a single diagnostic connector. Testing is accomplished by connecting analytic instrumentation to the diagnostic connector. Several designs of analytic instruments exist which provide for varying degrees of test comprehensiveness. The peculiarities of bus maintenance, the evaluation process, tradeoffs related to a test system requirements versus benefits derived, and how the instrumentation system design was tailored from a military to a commercial application are described. The results of the evaluation are presented along with a review of other consideration factors including fuel shortage, fleet capital investment spiral, and cost and availability of maintenance personnel.

by J. M. Laskey; R. F. Barry
Radio Corp. of America. Government Communications and Automated Systems Div.
Rept. No. SAE-740532 ; 1974 ; 11p 6refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 113

GROUP 1A PASSENGER TIRE. QUALIFICATION TREAD WEAR (ROAD) TESTING OF TIRES

Tabular data are presented on passenger tire road tests. Accumulate miles and costs for each tire manufacturer are given along with car-tire manufacturer relationship and the rotation of tires. Tire weights, tread width, and groove widths are noted.

Retreading Res. Associates, Inc., 6819 Elm St., McLean, Va. 22101
Contract GS-OOS-FPNMV-S-03364-A-3-22-68
1968 ; 68p
Availability: Corporate author

HS-016 114

A DIAGNOSTIC SYSTEM FOR VEHICLES BASED ON THE MONITORING OF OFF-NORMAL CONDITIONS DURING DAY-TO-DAY OPERATIONS

Vehicle diagnostic systems have been proposed which are based on the interrogation of a series of sensors located at critical points of the vehicle by an automatic check-out device which is a part of the service shop equipment. At least one system of this type already is in use on an imported passenger car. Systems also are in existence which provide a series of alarms to warn the operator of certain off-normal conditions which may occur during daily vehicle operation. Many off-normal conditions thus alarmed may never be reported because they are of a momentary or intermittent nature. This type of condition rarely can be detected by means of a checkout on the floor of the service shop. the diagnostic system described monitors off-normal conditions as they occur during day-to-day operation and provides a record of them for use by maintenance people. The simplest form of the system provides only a count of the number of occurrences. A more sophisticated form of the system provides a record of magnitude and duration with a real time base. A modified tachograph has been used in a basic system. A printer or magnetic recording also may be used.

by H. B. Rath
Mack Trucks, Inc., Allentown, Pa.
Rept. No. SAE-740534 ; 1974 ; 5p
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 115

ALUMINUM ALLOY ROAD WHEELS FOR PASSENGER CARS AND DERIVATIVES (CAST ONE-PIECE AND COMPOSITE CONSTRUCTIONS)

An Australian standard is presented to provide for a wheel which will perform consistently and well under normal driving conditions. Aluminum alloy wheels are made in two basic types: a one-piece cast construction type, and a two-piece or composite type consisting of an aluminum alloy spider fastened to a production type steel rim. It is noted that wheels conforming to this standard may fracture under conditions similar to those which produce severe buckling in steel wheels. Specifications of the standard deal with: scope, definition, construction, materials and heat treatment, casting techniques and methods of control, inspection of finished wheels, performance tests, type approval, product audit, responsibility for tests, disposal of test specimens, retention of documentation, and marking. Appendices are included on tests for dynamic cornering fatigue, dynamic radial fatigue, and impact test of wheel.

Standards Assoc. of Australia, Standards House, 80 Arthur St., North Sydney, N.S.W. 2060, Australia
Rept. No. AS-1638-1974 ; 1974 ; 28p
Australian Standard Specification.
Availability: Corporate author

HS-016 116

PASSENGER CAR WEIGHT TREND ANALYSIS. VOL. 1. EXECUTIVE SUMMARY

by W. Smalley; L. Forrest; F. G. Ghahremani; D. Smith; N. DeLong
Aerospace Corp., Environmental Programs Group, El Segundo, Calif. 90245
Contract EPA-68-01-0417
Rept. No. EPA-460/3-73-006a ; 1974 ; 27p
For abstract see vol. 2, HS-016 117.
Availability: Air Pollution Technical Information Center, Environmental Protection Agency, Res. Triangle Park, N. C. 27711 or NTIS

HS-016 117

PASSENGER CAR WEIGHT TREND ANALYSIS. VOL. 2. TECHNICAL DISCUSSION

Important findings and conclusions are presented from an analysis of the historical weight trends of passenger cars sold in the U.S. over a 16-year period, 1958 through 1973. Ancillary characteristics such as dimensional trends, displacement and compression ratio trends, and power and luxury item use trends were also examined. Sales trends show that total yearly sales have risen from about 3.15 million in 1947 to 11.34 million in 1973, with passenger cars in all market classes showing a marked and steady increase in curb weight. All market classes show an increase in both wheelbase and overall length with time. The 1974 compact models are as long as 1962-66 intermediate models. The sales-weighted displacement of standard size cars increased 22%; import models, 43%. Accessory equipment trends show increases in air conditioning installation, power brakes, power steering, power windows, radios, bucket seats, and other items once considered strictly luxury items. The combined value for air conditioning plus all other power and luxury items (standard plus optional) is estimated to be approximately 3.2% of the curb weight in 1973.

by W. Smalley; L. Forrest; F. G. Ghahremani; D. Smith; N. DeLong
Aerospace Corp., Environmental Programs Group, El Segundo, Calif. 90245
Contract EPA-68-01-0417
Rept. No. EPA-460/3-73-006b ; 1974 ; 166p 13refs
For Executive summary see vol. 1, HS-016 116.
Availability: Air Pollution Technical Information Center, Environmental Protection Agency, Res. Triangle Park. N. C. 27711 or NTIS

HS-016 118

EFFECTS OF ENGINE OIL SUPPLY ON ROCKER ARM AND BALL WEAR

In view of possible adverse effects on rocker arm and ball wear by the delay in oil reaching all of the rocker arm assemblies of a V-8 engine after starting at sub-zero temperatures, the effects of intermittent and zero oil flow on rocker arm and ball wear were investigated. The metallurgy of the rocker balls influenced ball wear greatly. Even when run for 9 hr with no oil flowing to them, sintered iron alloy balls had very little scuffing or wear, whereas sintered iron balls were heavily scuffed and worn. The impregnant used in sintered iron alloy balls influenced wear. With one type of organophosphorus impregnant, excessive scuffing and wear was observed, whereas with another organophosphorus and an oleic acid impregnant, little wear and no scuffing were found.

by C. K. Murphy
General Motors Res. Lab., Warren, Mich.
Rept. No. SAE-740540 ; 1974 ; 7p 4refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 119

COLD PUMPABILITY CHARACTERISTICS OF ENGINE OILS PREDICTED BY A BENCH TEST

The cold pumpability characteristics of nine commercial crankcase oils were evaluated using a V-8 engine and a bench test. These nine oils included most of the SAE viscosity classifications. The engine data were used for evaluating the ability of the bench test to predict the cold pumpability properties of crankcase oils. Additional tests were conducted to study some unusual cold pumping properties of two of the oils. One of these oils was very soak-time sensitive, while the other was found to improve in pumpability after only brief use in the test engine.

by C. R. Spohn; R. M. Stewart
Gulf Res. and Devel. Co., Pittsburgh, Pa.
Rept. No. SAE-740541 ; 1974 ; 10p 7refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 120

CONTINUOUS MEASUREMENT OF ENGINE OIL CONSUMPTION RATE BY THE USE OF S-35 TRACER

A reliable method was developed to measure continuously the oil consumption rate through all phases of engine operation. Oleic acid sulfide containing S-35 was selected as a radioactive tracer to be added to the engine oil. Engine exhaust gas containing the discharged oil was burned in an electric furnace and a gas burner and reacted with aqueous H2-02 solution. A plastic bead scintillator used for the detection of beta rays from the aqueous solution was sensitive enough to measure the consumption rate as low as 0.4 g/h. Some informative observations were also made on the oil consumption of the engine in transient and steady-state operation by use of this new measurement system.

by J. Kawamoto; M. Yamamoto; Y. Ito
Toyota Motor Co. Ltd., Central R and D Labs., Japan
Rept. No. SAE-740543 ; 1974 ; 10p 9refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 121

INSTALLATION OF OPTIONAL EQUIPMENT FOR COLD WEATHER STARTING IN EMERGENCY CONDITIONS

The installation of optional equipment for cold weather starting in emergency conditions is discussed as it relates to the effectiveness of a power company fleet in its operations and its maintenance of a high level of fleet availability. Practices have been established and equipment introduced to combat cold weather problems. Optional equipment mentioned includes: heavy duty starting motors and starting motor drives; heavy duty battery cables; engine cooling systems with temperature controlled radiator fan, radiator shutters, and electric engine

heaters; engine oil heaters; and radiator and undercarriage covers. The implementation costs are also examined.

by O. M. Germundson
Otter Tail Power Co.
Rept. No. SAE-740547 ; 1974 ; 8p
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974.
Availability: SAE

HS-016 122

AUTOMATIC STABILIZATION OF TRACTOR JACKKNIFING IN TRACTOR-SEMITRAILER TRUCKS

An automatic stabilizing technique to prevent tractor jackknifing in tractor-semitrailer trucks consists of the detection of the onset of a jackknife and the subsequent application of corrective action. The onset is detected through the behavior of the drive wheels, and the corrective action consists of a form of corrective braking; i.e., the simultaneous operation of the antiskid systems at all axles of the truck. The results obtained in this study indicate that the stabilizing technique may effectively prevent the development of a tractor jackknife during braking. The implementation of this technique in a real truck would be relatively simple and require a minimum of additional hardware.

by E. A. Susemihl; A. I. Krauter
Universidad Nacional del Sur, Argentina; Cornell Univ.
Rept. No. SAE-740551 ; 1974 ; 9p 7refs
Presented at the Combined Commercial Vehicle and Fuels and Lubricants Meetings, Chicago, 17-21 Jun 1974. Sponsored by the Eaton Corp., Cleveland, Ohio.
Availability: SAE

HS-016 123

INTEGRATING MANUFACTURING AND PRODUCT DESIGN INFORMATION FOR SELECTION OF HSLA STEEL

Several new high strength, low alloy (HSLA) steels have become commercially available over the past year which were introduced with inadequate data describing their properties, even though they differed from conventional 1008-1010. A list of material characteristics which are needed in selecting these new HSLAs is specified. The list includes design properties, manufacturing properties, and commercial factors. Laboratory tests are specified for measuring the properties of interest.

by R. Heimbuch; F. Schierloh
General Motors Corp., Manufacturing Devel.
Rept. No. SAE-740552 ; 1974 ; 7p 11refs
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974. Sponsored by the Eaton Corp., Cleveland, Ohio.
Availability: SAE

HS-016 124

INTERNATIONAL VIEW OF TRACTOR SEATING

The importance of seating in protecting tractor operators from shock and vibration is discussed. An overview of important seating criteria is presented and U.S. and European viewpoints are compared. The U.S. and Europe have pursued somewhat different paths in regard to seat evaluation and selection. In 1969, the Off-Highway Council established the Joint Seating Subcommittee reporting to the Tractor Technical Committee and the Construction and Industrial Machinery Technical Committee, to review information in these areas and to develop appropriate recommended practices. The activities of this Subcommittee are reported and suggestions for future work are outlined.

by A. O. Radke
UOP Bostrom (U. K.) Ltd.
Rept. No. SAE-740562 ; 1973 ; 33p 33refs
Presented at the National Combined Farm, Construction and Industrial Machinery and Fuels and Lubricants Meetings, Milwaukee, Wis., 10-13 Sep 1973.
Availability: SAE

HS-801 226

DEVELOPMENT OF IMPROVED INFLATION TECHNIQUES [FOR RESTRAINT STSTEMS]. TASK 2. FINAL PROGRAM REPORT

The effort to develop an improved inflatable restraint system is summarized. The objective was to provide frontal crash protection up to 50 mph for front seat occupants without undue hazards to out-of-position occupants during deployment. The inflation concept that was developed and proven successful for this program consisted of a dual bag design: a low pressure aspirator inflator filled head bag and a high pressure augmented inflator filled torso bag. The knee and femur load were cushioned by a fixed crushable restraint. Based on the results of 27 sled tests, it is concluded that this system can be effective in meeting FMVSS 208 injury criteria at speeds to 50 mph.

by D. W. Marlow; J. T. Johnson
Olin Corp., Marion, Ill. 62959
Contract DOT-HS-345-3-691
1975 ; 252p
Rept. for Jul 1973-Jun 1974.
Availability: NTIS

HS-801 319

THE INFLUENCE OF TIRE PROPERTIES ON PASSENGER VEHICLE HANDLING. VOL. 5. MEASURED TIRE PERFORMANCE DATA. FINAL REPORT

The properties of tires that affect vehicle dynamic response are identified, those effects are described in quantitative terms, and the degree to which the various tire parameters affect vehicle dynamic response, along with their relative importance, is evaluated. One of the main elements of this research study was a laboratory tire test program to measure the performance parameters of interest (braking and lateral force coefficients, aligning and overturning moments, etc.) on selected tires with specified construction properties. In this test program over 440 wet and dry multivariable test runs were made in over 70 tire configurations. The tire properties of interest were measured on highway and snow tires in three basic construction types, over a range of tire load ratings and in three basic aspect ratios and two wheel diameters. The test

sample included tires with rayon, fiberglas, and steel belts, and rayon, nylon, and polyester carcass materials. Most of the measured data from these tests is included in the forms of carpet plots and tabulations. Also included are tire model coefficients for most tires tested including aligning torque and overturning moment as well as lateral force and braking force coefficients.

by R. D. Roland; D. T. Kunkel
Calspan Corp.
Contract DOT-HS-053-3-727
Rept. No. ZM-5350-K-5 ; 1975 ; 441p
Rept. for 30 Jun 1973-30 Jun 1974. Vol. 1 is HS-801 323, vol. 2 is HS-801 324, vol. 3 is HS-801 325, and vol. 4 is HS-801 320.
Availability: NTIS

HS-801 347

URBAN PEDESTRIAN ACCIDENT COUNTERMEASURES EXPERIMENTAL EVALUATION. VOL. 2. ACCIDENT STUDIES. FINAL REPORT

A pedestrian accident data collection system was established in six major cities which involved using the regular police accident report form and a specifically designed supplementary data form. The information on the forms was combined, and the precipitating and predisposing factors, as well as the distribution of accident types in the accident data base, were determined. Such a data collection system, when fully operational, can provide a great deal of useful information and appears to be very appropriate for use in an accident-based evaluation of pedestrian safety measures designed to impact upon specific types of urban pedestrian accidents. Descriptive data on 2044 pedestrian accidents from the six study cities are presented. The cities participating in the study were Akron, Ohio; Miami, Florida; New York City; San Diego, California; Toledo, Ohio; and Washington, D. C.

by R. L. Knoblauch
BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, Va. 22042
Contract DOT-HS-190-2-480
1975 ; 61p
Rept. for Jun 1972-Jan 1974. Vol. 1 is HS-801 346; vol. 2, appendix A is HS-801 348.
Availability: NTIS

HS-801 355

RESULTS OF THE FIRST SEMI-ANNUAL QUALIFICATION TESTING OF DEVICES TO MEASURE BREATH ALCOHOL. INTERIM REPORT

Eight Evidential Breath Testers, submitted by six manufacturers, were performance tested according to the Standard for Devices to Measure Breath Alcohol. In addition, a prototype breath tester not commercially available was tested. Test data are tabulated, and test results presented, itemizing those instruments which met all of the requirements of the Standard for mobile and non-mobile evidential breath testers.

by A. L. Flores
Department of Transportation, Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
Rept. No. DOT-TSC-NHTSA-74-6 ; 1975 ; 26p
Rept. for Feb-Nov 1974.
Availability: NTIS

HS-801 358

CHARTER BUS/RUN OFF THE ROAD. MULTIDISCIPLINARY ACCIDENT INVESTIGATION

An in-depth multidisciplinary study of an accident involving a 1966 Blue Bird charter bus with 42 occupants is reported. The driver was unable to keep the bus under control on a long, steep downgrade and it finally left the roadway and ran down the side of a small steep canyon. The bus left the roadway at less than 30 mph, and did not turn over. One passenger was fatally injured and the rest sustained minor to moderate injuries.

by G. W. May; W. E. Baker
University of New Mexico, New Mexico Accident Study Program, Albuquerque, N. Mex. 87131
Contract DOT-HS-258-2-462
Rept. No. UNM-102 ; 1974 ; 158p
Rept. for 12 Jul-25 Oct 1974.
Availability: NTIS

HS-801 359

EVALUATIONS OF AUTOMOBILE REAR LIGHTING AND SIGNALING SYSTEMS IN DRIVING SIMULATOR AND ROAD TESTS. FINAL REPORT

Simulation studies were made to evaluate a number of conventional and experimental vehicle rear lighting systems. In normal car-following conditions, a number of experimental rear lighting systems using functionally separated signal lamps or color coding provided better performance in signal identification. Some of the results were confirmed in a road test. There were no stable differences in car-following performance measures between systems in the simulator. Analysis of rear-end collision reports were used to structure groups of scenes which were implemented in the simulator. In this test, which included these unusual (pre-crash) car-following maneuvers, there were no stable differences in performance of drivers attributable to various rear lighting systems, including a High Deceleration Signal (HDS) and an Accelerator Position Signal (APS). There were significant differences in performance due to the test conditions of relative velocity and acceleration, and inoperative stop signal lamps. Unobtrusive measurements of drivers on the road showed that they released the accelerator when the car with the APS coasted on their first exposure, but not in a second exposure. A subjective evaluation test of APS found favorable ratings of it, but an increase of accelerator pedal release frequency by the driver of the following car. It was concluded that simulated car-following performance was unaffected by the rear lighting systems. The APS provided no benefits in car-following in normal or unusual conditions, while following driver behavior showed a potentially undesirable characteristic in increased accelerator releases. No benefits were found for the HDS in these tests, but no undesirable aspects of the signal were evident. The findings are discussed in the context of previous studies.

by R. G. Mortimer; S. P. Sturgis
Michigan Univ. Hwy. Safety Res. Inst., Ann Arbor, Mich. 48105
Contract DOT-HS-031-3-723
Rept. No. UM-HSRI-HF-74-24 ; 1975 ; 171p 20refs
Rept. for 1 Jul 1973-30 Jun 1974.
Availability: NTIS

HS-801 360

AUTOMOTIVE LATERAL-IMPACT COLLISION TESTS, PHASE 1. FINAL REPORT

A series of lateral-impact tests were conducted to determine the worst impact angle with respect to automobile intrusion using the SAE moving barrier. Automobiles were impacted at 20 mph, and the impact angle varied from 50° to 80°. The maximum vehicle intrusion occurred in the tests with a 60° impact angle. The vehicle frame, tunnel, and rear anthropomorphic dummy accelerations show a decreasing trend as the lateral-impact angle decreases from 80° to 50°. The front anthropomorphic dummy chest accelerations show a less definite decreasing trend as the lateral-impact angle changes. The head of the front anthropomorphic dummy shows an increasing peak acceleration as the lateral-impact angle varies from 80° to 50°. Extensive acceleration force readings and photographs are included.

by H. Scheuerman; R. Young
Federal Aviation Administration, National Aviation Facilities Experimental Center, Atlantic City, N. J. 08405
Contract DOT-HS-032-1-036
Rept. No. FAA-NA-74-18 ; 1975 ; 184p 1ref
Rept. for Nov 1973-Apr 1974.
Availability: NTIS

HS-801 398

USAGE AND EFFECTIVENESS OF SEAT AND SHOULDER BELTS IN RURAL PENNSYLVANIA ACCIDENTS

An analysis of lap-belt and shoulder-belt usage and effectiveness in rural Pennsylvania accidents is presented. The data were collected by the Pennsylvania State Police in cooperation with NHTSA. The collection took place in late 1971 and early 1972 and employed the bilevel technique. The results obtained show that safety belts are highly effective in reducing occupant injuries and fatalities. In general, the results are similar to previous studies using police-reported data. Ejection during the crash and its effect on injury rates are discussed. A model for estimating the extent and the significance of incorrect lap-belt usage reporting is developed. It is recommended that: campaigns and legislative effort to increase belt usage be continued; accuracy of belt usage data be improved; and the additional data fields of make, model, age, and weight of involved vehicles be coded into the data file. Tables are given correlating such variables as: occupant seating position; injury severity; injury rates; fatality rates; vehicle preimpact speed; number of belts installed; vehicle age; vehicle damage area; driver route familiarity; occupant sex; weather conditions; road conditions; ejection; and lap and shoulder belt usage.

by C. J. Kahane
National Hwy. Traffic Safety Administration, Office of Statistics and Analysis, Washington, D. C. 20590
Rept. No. TN-N43-31-5 ; 1974 ; 74p 17refs
Prepared in cooperation with the Pennsylvania State Police.
Availability: NHTSA

HS-801 399

DOCUMENTATION FOR THE MICHIGAN/ILLINOIS BI-LEVEL DATA FILE [MOTORCYCLE SAFETY HELMET STUDY]

Police data were collected on 5608 motorcycle traffic and non-traffic accidents. For each accident, routine police accident data and supplementary information especially needed for the study were obtained. The various data files are described: the master file, containing all information extracted from each accident source document; the vehicle file, created from the master file; and the occupant file, created from the vehicle file. Tape file specifications are given. General coding procedures and conventions, code dictionaries, and data element availability are detailed for the master file. This file is organized in three records: accident and roadway data; vehicle and occupant data; and non-occupant data. Data record descriptions are given for all files. Appendices include the supplementary motorcycle study form and its instructions, and a listing of motorcycle and automotive protective helmets, both domestic and foreign, with AAMVA requirements for their approval.

National Hwy. Traffic Safety Administration, Office of Statistics and Analysis, Washington, D. C. 20590
1975 ; 82p
Availability: NHTSA

HS-801 407

AUTOMOBILE CONTROLLABILITY-- DRIVER/VEHICLE RESPONSE FOR STEERING CONTROL. VOL. 1. SUMMARY REPORT. FINAL REPORT

An applied research program is described which is aimed at identifying those characteristics of the driver/vehicle system which influence the driver's ability to maintain control over vehicle path in a variety of steering tasks. Program objectives include comprehensive measurements of driver and vehicle responses and the quantification of optimum driver/vehicle system characteristics as functions of simplified vehicle dynamic properties and task durations. A three-pronged approach of analysis, fixed-base simulation, and road test was used for compensatory steering tasks, while road test results were emphasized in discrete and transient maneuvers. The regulation task subjected the car to a random gust disturbance which had to be countered by driver control action. Driver describing functions were estimated (in the analytical treatment) and measured (in the fixed-base simulation and road test environments). A specially-designed variable stability vehicle was used to permit insertion of the simulated gust disturbances and for the driver/vehicle system measurement. Measures of system bandwidth, stability, and time delays were deduced, compared, and rationalized. The experimentally determined driver dynamics correlated well with the driver/vehicle system theory developed in the analytical phase. Key performance measures were shown to be descriptive, selective, and readily applicable to discriminate among the vehicle configurations. These were also correlated with driver ratings of attention and workload in the regulation task and of vehicle responsiveness in discrete tasks. The key vehicle parameters influencing the driver's response were the vehicle's overall yaw velocity to steering wheel gain and the yaw velocity numerator time con-

stant. Directional undamped natural frequency and damping ratio were also influential but secondary. A tentative optimum range of vehicle dynamics for the directional properties was established.

by D. T. McRuer; R. H. Klein
Systems Technology, Inc., 13766 S. Hawthorne Blvd., Hawthorne, Calif. 90250
Contract DOT-HS-359-3-762
Rept. No. TR-1040-1-I ; 1975 ; 270p 64refs
Rept. for Jun 1974-Oct 1975. Vol. 2 is HS-801 406.
Availability: NTIS

HS-801 409

ACCIDENT INVESTIGATION VEHICLE--OPERATIONAL MANUAL. FINAL REPORT. PT. 3

A special computerized vehicle has been developed for the scientific investigation and reconstruction of automobile accidents. Proper usage of that vehicle is described. Instructions on starting the minicomputer, sighting the physical evidence with the optical measurement system, and using the radiotelephone for communication with the larger timesharing computer for reconstruction operations are provided. Troubleshooting information is also included.

by J. P. Lynch
Calspan Corp., P. O. Box 235, Buffalo, N. Y. 14221
Contract DOT-HS-053-3-658
Rept. No. ZQ-5341-V-3 ; 1975 ; 70p 1ref
Rept. for Jun 1973-Dec 1974.
Availability: NTIS

HS-801 418

A SURVEY OF THE LITERATURE ON THE ROLE OF ALCOHOL IN BICYCLE/MOTOR-VEHICLE CRASHES. INTERIM REPORT

Domestic and foreign literature on bicycle/motor vehicle crashes was reviewed along with accident data from the files of selected accident record-keeping agencies. The main conclusions drawn from the literature review are shown: about 3% of all bicycle/motor vehicle accidents involve alcohol use by one of the vehicle operators; about 78% of the alcohol related bicycle/motor vehicle crashes involve a drinking motorist and about 22% involve a drinking bicyclist; the incidence of alcohol-related bicycle/motor vehicle crashes has remained relatively constant during the past five years; the frequency of alcohol-related bicycle/motor vehicle accidents is greatest at about 7:00 p.m. and on weekend days; inferential evidence suggests that the skills required to avoid bicycle/motor vehicle accidents are seriously degraded by alcohol.

by K. D. Cross; G. Fisher
Anacapa Sciences, Inc., 2034 De La Vina, P. O. Drawer Q, Santa Barbara, Calif. 93102
Contract DOT-HS-4-00982
1975 ; 28p 34refs
Rept. for Jun-Sep 1974.
Availability: NTIS

HS-801 421

DETERMINATION OF MOTOR VEHICLE CHARACTERISTICS AFFECTING DRIVER HANDLING PERFORMANCE. VOL. 1, TECHNICAL REPORT. FINAL REPORT

Four representative vehicles used in a previous open-loop comparative study were tested with a sampling of volunteer drivers from the general public. The more significant vehicle handling and stability performance parameters in maneuvering situations are identified which require extreme vehicle dynamic performance up to and including limit of performance in situations such as those which would result in vehicle spin-out or plow-out. The extent to which a representative sampling of vehicle drivers utilize the full capacity of the vehicle with respect to the significant vehicle response and feedback characteristics is examined. The identified parameters are ranked relative to their importance in the vehicle-driver combinations in accident avoidance maneuvers. The most discriminating parameters include sideslip angle, yaw rate, initial steer angle, and sideslip angle rate, along with path curvature ratio and lateral acceleration.

by G. G. Hayes; R. J. Koppa; J. T. White
Texas A and M Res. Foundation, Texas Transportation Inst., College Station, Tex. 77843
Contract DOT-HS-065-3-724
Rept. No. RR-RF-3001-VOL-1 ; 1975 ; 171p 11refs
Rept. for Jun 1973-Feb 1975. Vol. 2 is HS-801 422. For summary report, see HS-801 423.
Availability: NTIS

HS-801 422

DETERMINATION OF MOTOR VEHICLE CHARACTERISTICS AFFECTING DRIVER HANDLING PERFORMANCE. VOL. 2, APPENDICES. FINAL REPORT

Appendices are presented which contain exhibits, data, graphs, test plans, and test procedures related to motor vehicle characteristics affecting driver handling performance. An operational accident prevention and rescue plan is included, giving applicable documents, safety equipment (including vehicles, supplies, and facilities), personnel qualifications and duty cycles, procedures, driver provisions, and test vehicle preventive maintenance procedures.

by G. G. Hayes; R. J. Koppa; J. T. White
Texas A and M Res. Foundation, Texas Transportation Inst., College Station, Tex. 77843
Contract DOT-HS-065-3-724
Rept. No. RR-RF-3001-Vol-2 ; 1975 ; 230p
Rept. for Jun 1973-Feb 1975. Vol. 1 is HS-801 421; summary rept. is HS-801 423.
Availability: NTIS

HS-801 423

DETERMINATION OF MOTOR VEHICLE CHARACTERISTICS AFFECTING DRIVER

HANDLING PERFORMANCE. SUMMARY REPORT. FINAL REPORT

by G. G. Hayes; R. J. Koppa; J. T. White
Texas A and M Res. Foundation, Texas Transportation Inst., College Station, Tex. 77843
Contract DOT-HS-065-3-724
Rept. No. RR-RF-3001-Summ ; 1975 ; 21p 2refs
Rept. for Jun 1973-Feb 1975. For abstract, see HS-801 421 and HS-801 422.
Availability: NTIS

HS-801 424

SURVEY OF ODOMETER DISCLOSURE. SUMMARY REPORT

Findings from a survey on odometer disclosure requirements are summarized, with some additional interpretation included. A striking contrast is noted between non-compliance of telephone contacts and dealer contacts. The surveys were made in various western and midwestern states. Suggestions are made for gathering more in-depth and reliable data in a follow-up study. It is shown that out of 700 telephone contacts, there was a 31% rate of non-compliance; of 50 dealer visits, only 6 cases of non-conformity were found.

by D. Nehamen
Amex Civil Systems, 931 S. Douglas St., El Segundo, Calif. 90245
Contract SB-9238(a)-74-P-548
1974 ; 9p
Prepared for the Dept. of Transportation. See also HS-801 425.
Availability: NTIS

HS-801 425

ODOMETER DISCLOSURE REQUIREMENTS SURVEY. FINAL REPORT Smith-Waison

Representative samples in several East Coast cities were used to determine the percentage of dealers and of purchasers who are aware of and are in compliance with the Federal Odometer Disclosure Regulation. Direct dealer contact as well as telephone contacts were used. It was found that in only two of the cities visited, Miami and New Haven, was there 100% conformity with the requirements. No definite pattern emerged between type of dealership and nonconformity nor between age of the car and nonconformity. New car dealers generally complained that used car dealers are not complying with the regulation, and many recommended that all states should be required to enforce the regulation. The telephone survey showed that in most cases of private sales, a relatively small proportion of purchasers were provided with a written statement (4.7%) and most of them (80%) did conform with the federal requirements. In the case of dealer sales, large proportions of buyers received written statements prior to transfer of ownership (60.5%) but a relatively large proportion of these (70%) did not meet the requirements of the federal regulation. There was a discrepancy between information received from dealers and that from purchasers. Recommendations are offered for encouraging compliance.

Lawrence Johnson and Associates, Inc., 2001 S St., N.W., Suite 502, Washington, D. C. 20009
Contract SB-320-8(a)-74-C-141
1974 ; 25p
Prepared for the National Hwy. Traf. Safety Administration, Washington, D. C. See also HS-801 424.
Availability: NTIS

HS-801 426

DEVELOPMENT OF ADVANCED PASSIVE RESTRAINT SYSTEMS FOR SUBCOMPACT CAR DRIVERS. PROGRESS REPORT, JULY 1974

The development status of a subcompact car advanced passive restraint system is reported. Preparations are described for 50 mph barrier crash tests with the restraint system developed to date, and the tests and results are evaluated. Two development sled tests with the 95th percentile male driver are also discussed. With the exception of problems with steering column rotation, the test results were encouraging. Further testing is projected to demonstrate the system's ability to satisfy the injury criteria for the 95th percentile male. Photographic and graphic data are included.

by M. Fitzpatrick
Minicars, Inc., 35 La Patera Lane, Goleta, Calif. 93017
Contract DOT-HS-113-3-742
Rept. No. PR-Jul-74 ; 1974 ; 26p
Availability: NHTSA

HS-801 427

AN INVESTIGATION OF SAFETY BELT USAGE AND EFFECTIVENESS. INTERIM REPORT

The utilization of seat belts and their effectiveness in reducing injury in accidents is examined. A stratified random sample of passenger cars was taken on North Carolina roads during October, 1974, resulting in approximately 21,000 observations. Belt utilization was recorded along with age (approximate), sex, and race of driver, and vehicle license plate number. Safety belt effectiveness in accidents is initially discussed from a population parameter point of view. Three measures are introduced and their features explored. Several inferential problems are considered and certain simplifications obtained. Because of probable misclassification errors in belt usage and degree of injury due to the police reports, all two-way belt X injury tables will be adjusted to match certain desired margins based on external information (to be collected). This report includes some exploratory studies of the degree of misclassification errors involved in such tables along with some tools to partially solve the problem. The methodology is also developed for investigating the bivariate injury distribution for belted and unbelted drivers to provide insight into the mechanism of the injury reducing potential of belts in accidents.

by Y. Hochberg; D. W. Reinfurt
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N. C. 27514
Contract DOT-HS-4-00897(SY085)
Rept. No. DOT-HS-4-00897-(SY085)-2 ; 1974 ; 70p 26refs
Rept. for 1 Jul 1974-31 Dec 1974.
Availability: NTIS

HS-801 428

THE EFFECTS OF THE LOWERED MAXIMUM SPEED LIMIT AND FUEL SHORTAGE ON HIGHWAY SAFETY IN NORTH CAROLINA. INTERIM REPORT

The effects of the lowered maximum speed limit and other fuel conservation measures which were instituted during the fuel shortage from November, 1973 to March, 1974 are reported. Comparisons made between the first four months of 1974 and the same period a year earlier indicate that accidents decreased 9.5%, fatal accidents decreased 21%, and injury accidents decreased 12% in North Carolina. The severity of accidents was decreased during the fuel shortage, and gross exposure decreased an estimated 3.2%. The fatality and serious injury rates per hundred million vehicle miles dropped by 17.7% and 19%, respectively. These changes were attributed to the lowered maximum speed limit, decreased exposure, changes in vehicle sizes and occupancy, and shifts in the times at which trips were made and the roads on which they were made. Further research is planned on exposure changes, analysis of the accident and injury data, the use of the T.A.D. severity ratings for severity analysis, the effect of Daylight Savings Time, especially on bicycle and pedestrian accidents, and other areas.

by A. F. Seila; D. W. Reinfurt
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N. C. 27514
Contract DOT-HS-4-00897(SY085)
Rept. No. DOT-HS-4-00897(SY085)-1 ; 1974 ; 61p 6refs
Rept. for 1 Jul 1974-31 Dec 1974. Text is identical with report dtd. Mar 1975.
Availability: NTIS

HS-801 437

VEHICLE-IN-USE LIMIT PERFORMANCE AND TIRE FACTORS. APPENDICES D, E, F, G

Tire force and moment measurements were obtained from two sources, the Highway Safety Research Institute (HSRI) flat-bed tire tester and the HSRI mobile tire tester. The flat-bed tester is a low speed (1 mph) indoor machine, while the mobile tire tester is a high speed (0 to 70 mph) over-the-road device. Statistical and graphical data are presented in the four appendices on: tire test data; the vehicle test program; vehicle test data; and vehicle parameter measurements.

by R. E. Wild; R. D. Young; C. C. MacAdam; R. Gupta
Highway Safety Res. Inst., Univ. of Mich., Ann Arbor, Mich. 48105
Contract DOT-HS-031-3-693
Rept. No. UM-HSRI-PF-75-1-4 ; 1975 ; 438p 2refs
See also HS-801 438-440.
Availability: NTIS

HS-801 438

VEHICLE-IN-USE LIMIT PERFORMANCE AND TIRE FACTORS. THE TIRE-IN-USE. SUMMARY FINAL REPORT.

The influence of tire-in-use factors (inflation pressure, replacement mixes, and wear) on the steering and braking response of automobiles is examined through analysis simulation, laboratory, and over-the-road tire testing, and vehicle testing. Results for a 1971 Mustang and a 1973 Buick station wagon illustrate the influence of tire-in-use factors on the open-loop braking and/or turning performance in drastic maneuvers on wet and dry surfaces, and the understeer/oversteer factor for maneuvers involving lateral accelerations below 0.3 g. It is shown that differences in tire mechanical properties between the front and rear wheels can cause significant and potentially dangerous changes in limit response and from the stability and control characteristics intended by the vehicle manufacturer. It is recommended that: inspection limits for inflation pressure be within plus or minus 1 psi of the manufacturer's recommended level; minimum tread-groove depth exceed 2/32 in; and further research be conducted to develop a cost effective means for indicating the lateral force characteristics of a tire.

by P. S. Fancher; J. E. Bernard
Highway Safety Res. Inst., Univ. of Mich., Huron Pkwy and Baxter Rd., Ann Arbor, Mich. 48105
Contract DOT-HS-031-3-693
Rept. No. UM-HSRI-PF-75-1-1 ; 1975 ; 34p 7refs
Report for Jun 1973 - Jan 1975. See also HS-801 437, 439, 440.
Availability: NTIS

HS-801 439

VEHICLE-IN-USE LIMIT PERFORMANCE AND TIRE FACTORS. THE TIRE-IN-USE. FINAL TECHNICAL REPORT

The influence of tire-in-use factors (inflation pressure, replacement mixes, and wear) on the steering and braking response of automobiles is examined through analysis, simulation, laboratory and over-the-road tire testing, and vehicle testing. Results for a 1971 Mustang and a 1973 Buick station wagon illustrate the influence of tire-in-use factors on the open-loop braking and/or turning performance in drastic maneuvers on wet and dry surfaces, and the understeer/oversteer factor for maneuvers involving lateral accelerations below 0.3 g. It is shown that differences in tire mechanical properties between the front and rear wheels (as caused by tire-in-use factors) can cause significant and potentially dangerous changes in limit response and from the stability and control characteristics intended by the vehicle manufacturer. It is recommended that: inspection limits for inflation pressure be within ± psi of the manufacturer's recommended level; minimum tread-groove depth exceed 2/32 in; and further research be conducted to develop a cost effective means for indicating the lateral force characteristics of a tire.

by J. E. Bernard; P. S. Fancher; R. Gupta; H. Moncarz; L. Segel
Highway Safety Res. Inst., Univ. of Mich., Huron Pkwy and Baxter Rd., Ann Arbor, Mich. 48105
Contract DOT-HS-031-3-693
Rept. No. UM-HSRI-PF-75-1-2 ; 1975 ; 230p 25refs
Report for Jun 1973 - Jan 1975. See also HS-801 437, 438, 440.
Availability: NTIS

HS-801 440

VEHICLE-IN-USE LIMIT PERFORMANCE AND TIRE FACTORS. APPENDICES A, B, C

Appendices cover a literature survey, a tire-vehicle system simulation model and a vehicle linear analysis program. The literature survey is intended to gather, organize, and summarize information relative to the influence of tire-in-use fac-

tors on vehicle performance. Factors considered are: the performance characteristics of different replacement tires; tread wear; inflation pressure; vertical loading; tire temperature; and vehicle speed. The tire-vehicle system simulation model is worked out in detail, and a linear analysis is presented based on results obtained from a mathematical model and computer simulation which was developed.

by H. Moncarz; J. E. Bernard; R. Gupta; P. S. Fancher
Highway Safety Res. Inst., Univ. of Mich., Ann Arbor, Mich. 48105
Contract DOT-HS-031-3-693
Rept. No. UM-HSRI-PF-75-1-3 ; 1975 ; 259p refs
See also HS-801 437-439
Availability: NTIS

HS-801 441

NATIONAL HIGHWAY SAFETY ADVISORY COMMITTEE ANNUAL REPORT 1973

The committee's legislative history and organization is reviewed, and details are given on standing and special subject committees, departmental certificates of commendation, and resolutions adopted and department replies in 1973. Subcommittee activities reviewed include those of the Subcommittee on Research and Program Development, the Subcommittee on Standards Implementation, and the Ad Hoc Task Force on Adjudication. The resolutions deal with: federal funding of police on interstate systems; conference on interstate system safety and efficiency; mandatory seat belt legislation; manpower training for highway safety; committee liaison with state legislatures; the Interregional Highway Safety Conference; reports on standards implementation; the National Alcohol Safety Action Plan; proposed highway safety program standards; traffic offense adjudication and rehabilitation alternatives; committee liaison with state legislatures; the third Highway Safety Conference; incentives for compliance with highway safety programs; and commendation for improved communication.

National Hwy. Safety Advisory Com., Washington, D. C. 20590
1974 ; 25p
Availability: NTIS

HS-801 442

NATIONAL MOTOR VEHICLE SAFETY ADVISORY COUNCIL ANNUAL REPORT 1973

The council's legislative history, organization, and highlights of the year are reviewed, along with activities of standing and special committees, and council recommendations and responses. The committee activities discussed include those of the Accident Avoidance and Operating Systems Committee, the Consumer and Public Information Committee, the Crashworthiness Committee, an Ad Hoc Force on Research Funding, and awards committees. The recommendations deal with mandatory seat belt usage, a coordinated accident investigation program, the starter restraint system interlock, air cushion systems availability, passive harness restraint systems compliance, and research on windshield and mirror safety and fields of view.

National Motor Vehicle Safety Advisory Council, Washington, D. C. 20590
1974 ; 16p
Availability: NTIS

HS-801 443

FIAT 2000 AMF ESVs--FRONT-TO-FRONT IMPACT TEST AT 75 MPH. FINAL REPORT

Test results are reported of a front-to-front collision between a Fiat 2000 lb class Experimental Safety Vehicle (ESV) and a 5200 lb AMF ESV at a closure speed of 75 mph. The test objective was to assist in the understanding of problems associated with crashworthiness in the traffic mix; i.e., car-to-car compatibility and aggressiveness. This crash test evaluated the structural integrity and dynamic response of the Fiat ESV when involved in collision with a larger ESV. The test also studied the potential benefits of velocity-sensitive front-end structures to accomodate lighter weight vehicles such as the Fiat ESV. The test was successful in that Fiat compartment integrity was adequately maintained. The AMF vehicle's hydraulic system stroked almost 20 in, compared to the 24-in dynamic crush for the Fiat, indicating that the heavier AMF vehicle absorbed a significant portion of the crash energy. The coefficient of restitution as well as the Fiat vertical and pitch accelerations were determined since these parameters influence restraint system requirements. Since no restraint systems were provided in this Fiat structural test vehicle, dummies were not used and occupant injury evaluations were not determined.

by S. Davis; N. B. Johnson; K. Premji
Ultrasystems, Inc., Dynamic Science Div., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
Contract DOT-HS-4-00860
Rept. No. 2310-74-59 ; 1974 ; 162p 2refs
Availability: NTIS

HS-801 444

OCCUPANT RESTRAINT SYSTEMS. MONTHLY PROGRESS REPORT OF RESEARCH ACTIVITIES, NOVEMBER 1974

Photographs and graphs are presented along with test results on the status of research on various restraint system aspects. They include: lower limb project; magnetic joint development; additional photometric instrumentation; comfort and convenience in 1975 models; improved sled lighting; dynamic sled testing operations; child restraint rollover test development.

by S. L. Gordon; C. H. Melton; J. L. Prince; M. P. Haffner; E. C. Cooke; R. S. Pizer; J. Haines; P. Orticke; F. da Costa; G. Cohen
National Hwy. Traffic Safety Administration, Safety Res. Lab., Washington, D. C. 20590
Rept. No. PR-Nov-74 ; 1974 ; 36p
Availability: NHTSA

HS-801 445

OCCUPANT RESTRAINT SYSTEMS. MONTHLY PROGRESS REPORT OF RESEARCH ACTIVITIES, DECEMBER 1974

Photographs and test result statistics are presented to illustrate the status of research activities in three areas: child restraint rollover test development; photometric data analysis; and dynamic testing operations. In the dynamic testing operations, a summary of the peak g levels and impact velocities for the Alderson dummy for each of three series of tests, forward, side, and rear facing, is included. The forward facing tests were conducted at the 30mph crash impact level, and the side and rear impacts at the 20mph level.

by M. P. Haffner; C. H. Melton; J. L. Prince; E. C. Cooke; G. Cohen; F. da Costa; J. Haines; D. Buchalter; S. L. Gordon
National Hwy. Traffic Safety Administration, Safety Res. Lab., Washington, D. C. 20590
Rept. No. PR-Dec-74 ; 1974 ; 25p
Availability: NHTSA

HS-801 446

OCCUPANT RESTRAINT SYSTEMS. MONTHLY PROGRESS REPORT OF RESEARCH ACTIVITIES, JANUARY 1975

Research status is presented on several restraint system activities. New instrumentation and data reduction capability added to the Safety Research Laboratory Dynamic Sled Facility include: improved hybrid 2 femur force transducer and resultant computer calibration, and SAE J 211 instrumentation. The child restraint rollover test development program completed and successfully tested the prototype test fixture in its electrical drive configuration, and began testing of child restraints on the fixture. In the dynamic sled testing operations, improvements were made in camera placement, the overhead lighting system, and instrumentation, but a data transmittal problem is noted in the tape search control unit. Several pieces of computer equipment were received and installed in the PDP-11 computer system, and a new program called SCOPE has been written. The leg testing program reports maintenance and performance of the foot load cell device. Photographs, graphs, and tables are provided for all activities.

by J. Haines; M. P. Haffner; C. H. Melton; J. L. Prince; E. C. Cooke; G. Cohen; F. da Costa; D. Buchalter; S. Gordon
National Hwy. Traffic Safety Administration, Safety Res. Lab., Washington, D. C. 20590
Rept. No. PR-Jan-75 ; 1975 ; 48p
Availability: NHTSA

HS-801 447

BRAKING SYSTEMS. MONTHLY PROGRESS REPORT OF RESEARCH ACTIVITIES, DECEMBER 1974

The status of research activities relating to braking systems is reviewed, with reference to a road test and component evaluation program, and studies in the Chemistry Laboratory. The MVSS 105-75/MVSS 121 Vehicle Test Program is reported, along with air brake hose fatigue testing, SAE Research Project R-18, and Markey Vapor Lock Testers, including cross checks on test fluids and effects of free water. Charts and statistical tables are provided.

by R. W. Radlinski; J. L. Harvey
National Hwy. Traffic Safety Administration, Safety Res. Lab., Washington, D. C. 20590
Rept. No. PR-Dec-74 ; 1974 ; 50p
Availability: NHTSA

HS-801 448

BRAKING SYSTEMS. MONTHLY PROGRESS REPORT OF RESEARCH ACTIVITIES, JANUARY 1975

The research status of braking systems is reviewed with regard to the Braking Systems Road Test and Component Evaluation Program, the Braking Systems Performance Laboratory, and the Chemistry Laboratory. The FMVSS 105-75/FMVSS 121 Vehicle Road Test Program is examined in terms of vehicle tests, test vehicle instrumentation and preparation, instrumentation calibration, air brake system pneumatic timing, control trailers and test vehicles, and data reduction techniques. Air brake hose fatigue testing is also described, along with the status of dynamometer tests of Chevrolet, Dodge, and Mercury front disc brakes; humidification; computer course; Wallace Hardness Testers, and rubber swell.

by R. W. Radlinski; E. Kakaley; J. L. Harvey
National Hwy. Traffic Safety Administration, Safety Res. Lab., Washington, D. C. 20590
Rept. No. PR-Jan-75 ; 1975 ; 41p
Availability: NHTSA

HS-801 449

TIRE SYSTEMS. MONTHLY PROGRESS REPORT OF RESEARCH ACTIVITY, NOVEMBER--DECEMBER 1974

The design, construction, and instrument checkout of the Tire Systems Division Mobile Tire Traction Dynamometer (MTTD) is reviewed, along with a report of the instrumentation by Texas Transportation Institute of the SRL Traction Test Car under DOT contract. Diagrams and specific calibrations are included.

by F. C. Brenner
National Hwy. Traffic Safety Administration, Safety Res. Lab., Washington, D. C. 20590
Rept. No. PR-Nov/Dec-74 ; 1974 ; 21p
See also HS-801 280 and HS-801 340. Includes rept. entitled "Traction Test Car" by G. Shute, Texas Transportation Inst., Contract DOT-HS-065-2-265.
Availability: NHTSA

HS-801 454

UNIFORM TIRE QUALITY GRADING. DEVELOPING A ROAD PROFILE FOR SKID RESISTANCE TESTING. FINAL REPORT

Skid resistance information from a wide variety of sources throughout the U.S. is summarized in an effort to determine whether surfaces with skid numbers below 35 should be used in traction grading. It is recommended that a constant invento-

ry of pavement skid resistance be maintained to determine repair priorities and to minimize accidents on these slippery pavements, and that a slippery surface (skid number between 20 and 25) be included in the traction test procedure for uniform tire quality grading.

by H. Williams
National Hwy. Traffic Safety Administration, Safety Res. Lab., Washington, D. C. 20590
Rept. No. T-1011 ; 1975 ; 15p 11refs
On cover: Tire Systems.
Availability: NHTSA

HS-801 456

PROGRESS REPORT, AUGUST 1974. [DEVELOPMENT OF ADVANCED PASSIVE RESTRAINT SYSTEMS FOR SUBCOMPACT CAR DRIVERS]

Sled tests with dummies representing the extremes of the anthropometric size range (from 5th percentile female through 95th percentile male) are reviewed. The tests were all in the 50 mph range. Very high relative velocity built between the driver and the compartment, resulting in very high chest onset rates with correspondingly high late peaking g levels once good contact has been made. Chest peak g level was reduced by added energy absorbed in ride down. Plans for oblique sled tests are reported.

by M. Fitzpatrick
Minicars, Inc., 35 La Patera Lane, Goleta, Calif. 93017
Contract DOT-HS-113-3-742
Rept. No. PR-Aug-74 ; 1974 ; 41p
Availability: NHTSA

HS-801 458

ADVANCED PASSIVE RESTRAINT SYSTEM FOR SUBCOMPACT SIZE VEHICLE FRONT SEAT PASSENGERS. PROGRESS REPORT NO. 7, 6 JANUARY TO 2 FEBRUARY 1975

The status of an advanced passive restraint system is reported in terms of sled test preparation, briefings, and static crush tests on the bolster struts. The sled test results indicate that the system is capable of providing occupant protection from fatality or serious injury in the subcompact car environment for frontal impacts up to 45 to 50 mph. Frontal impact protection was provided for test dummy sizes of 5th percentile female and 50th percentile males. The system was not effective in preventing severe head to A pillar contact at a skidded oblique impact angle at 20 ° at 47 mph. The system can be assembled from existing off-the-shelf components. The restraint system is described as a 21-in diameter by 20-in wide cylindrical vented bag, a 6-in diameter by 20-in wide sheet metal manifold supported by a backing plate and two collapsible struts, consisting of standard GM Energy Absorbing steering columns plus aluminum honeycomb cores, two standard solid propellant steering column air bag inflators, and an Ensolite covered aluminum honeycomb knee bar 10-in by 20-in by 6-in thick. Graphs and photographs are included.

by D. J. Romeo
Calspan Corp., Buffalo, N. Y. 14221
Contract DOT-HS-4-00972
Rept. No. ZM-5566-V; PR-7 ; 1975 ; 14p
Availability: NHTSA

HS-801 459

FEASIBILITY STUDY OF PLASTIC AUTOMOTIVE STRUCTURE. PROGRESS REPORT FOR JANUARY 1975

A status report is offered on the feasibility of employing plastic materials in the fabrication of vehicle structure to improve crashworthiness characteristics and to decrease weight in comparison to conventional metallic structure. Details are offered on the integration of plastics in the automotive structure, including four general concepts of frontal structure considered for oblique impact of a subcompact car. Dynamic crush tests and energy management analyses are reported. A weight reduction of 36.22 lb is seen for the case of a six cylindrical crush element flat barrier impact structure. The recycling characteristics of plastics are reviewed. Techniques for separating plastics from mixed wastes and from each other are still in the experimental stage and there are no effective market mechanisms for trade in contaminated mixed plastics. Eighty percent of plastic waste is thermoplastic materials. Recycling efforts have been concentrated on this waste portion. Thermosets in general cannot be reprocessed and can only be ground for fillers or used as land fill. Recycling of specific thermosets, flexible and rigid urethanes, has been accomplished by reducing and recovering the components. Present technology and economics indicate that the use of waste plastics in an unsorted form for the recovery of energy by pyrolysis or incineration will comprise the most successful plastics recycling program.

by H. A. Jahnle
Budd Co. Technical Center, 300 Commerce Dr., Fort Washington, Pa. 19034
Contract DOT-HS-4-00929
Rept. No. PR-Jan-75 ; 1975 ; 80p 18refs
Includes report entitled "Plastics Recycling."
Availability: NHTSA

HS-801 461

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 1. PERIODIC MOTOR VEHICLE INSPECTION

Guidelines for state and local governments are offered for a properly planned and administered vehicle inspection program to reduce traffic accidents by lessening the frequency of vehicle equipment failures, thereby contributing to a coordinated national program aimed at upgrading all phases of highway safety. The purpose of periodic motor vehicle inspection, authority for this program, general policy, program development and operations, program evaluation, reports to communicate program activity and performance, local government participation, and funding criteria are discussed. Appendices include: the highway safety program standard on periodic motor vehicle inspection, the vehicle in use inspection standard; procedures for approval of experimental, pilot, or demonstration motor vehicle inspection programs; examples of representative projects which may be of benefit in vehicle inspection programs; and an outline of special vehicle inspection.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
1974 ; 89p 12refs
Supersedes HS-820 037. Vol. 2 is HS-801 462, v 3 is HS-820 039, v 4-6 are HS-801 463--HS-801 465, v 7 is HS-801 349, v 8 is HS-801 514, v 9 is HS-801 466, v 10 is HS-820 046, v 11-14

are HS-801 467--HS-801 470, v 15 is HS-801 402, v 16 is HS-820 050, v 17 is HS-801 329, and v 18 is HS-801 471.
Availability: GPO $1.80

HS-801 462

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 2. MOTOR VEHICLE REGISTRATION

Guidelines for state and local governments are offered for a motor vehicle registration program which has as its major purpose the development of a system that encourages and maximizes its safety potential as an identification, information, and control mechanism. Details are given on: program planning; establishment of vehicle ownership; gross laden weight of commercial vehicles; control of junked and abandoned vehicles; vehicles subject to registration; the original registration application; grounds for refusing registration; issuance of registration plates; issuance of registration card; maintenance of registration applications and vehicle indices; registration card to be carried and exhibited on demand; display of registration plates; registration renewal cycle; authority of department to cancel, suspend, or revoke registration; transfer of registration; special registration applying to manufacturers, transporters, and dealers; general information systems requirements; systems input requirements; systems procedures requirements; systems feasibility; program and information systems training; levels of program appraisal; factors to consider; criteria for measuring program effectiveness; program evaluation and review; program evaluation checklist; and information requirements and types of reports necessary. Local government participation, highway safety program standard on motor vehicle registration, and representative projects are also described.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
1974 ; 62p 2refs
Supersedes HS-820 038. Vol. 1 is HS-801 461, v3 is HS-820 039, v4-6 are HS-801 463--HS-801 465, v7 is HS-801 349, v8 is HS-801 514, v9 is HS-801 466, v10 is HS-820 046, v11-14 are HS-801 467--HS-801 470, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.
Availability: GPO $1.65, Stock no. 5003-00185

HS-801 463

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 4. DRIVER EDUCATION

Guidelines are offered to assist state and local governments in initiating, expanding, and improving driver education programs as outlined in the adopted national standard for this area of highway safety. The purpose, authority, and general policy of the program are stated. Details of program development and operations are given on: program rationale; program availability to all youths of licensing age; state administration; basic course content; specific course content; state approval of courses in school systems; state licensing of commercial driving schools; qualifications for driver education teachers; qualifications for commercial driving school instructors; preparation of driver education teachers and commercial driving school instructors; and research and development. Aspects of program evaluation, and reports necessary to the program are discussed. Additional information is presented on local government participation, funding criteria for 402 driver education projects, the Highway Safety Program Standard on driver education, representative projects, and resource organizations.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
1974 ; 53p 17refs
Supersedes HS-820 040. Vol. 1 is HS-801 461, v2 is HS-801 462, v3 is HS-820 039, v5-6 are HS-801 464--HS-801 465, v7 is HS-801 349, v8 is HS-801 514, v9 is HS-801 466, v10 is HS-820 046, v11-14 are HS-801 467--HS-801 470, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.
Availability: GPO $1.55, stock no. 5003-00186

HS-801 464

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 5. DRIVER LICENSING

Guidelines for state and local governments are offered for a driver licensing program which will aid the state in extending the influence of its driver licensing program in improving highway safety and traffic flow by identifying and describing the essential components of such programs, and outlining methods for program implementation and evaluation. The purpose, authority, and general policy of the program are stated. Details are given on: driver license applications, examinations, and issue; driver information systems; driver improvement program; driver instruction manuals; personnel; facilities and equipment; and working relationships. Program evaluation, including purposes of evaluation, general description, identification of objectives and resource requirements, implementation plan, progress evaluation and reporting; and a sample checklist, is discussed. Attention is also directed toward report making, local government participation, the Highway Safety Program Standard on driver licensing, representative projects, resource organizations, motorcycle operator licensing, periodic driver reexamination program, and driver license records.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
1974 ; 116p 26refs
Supersedes HS-820 041. Vol. 1 is HS-801 461, v2 is HS-801 462, v3 is HS-820 039, v4 is HS-801 463, v6 is HS-801 465, v7 is HS-801 349, v8 is HS-801 514, v9 is HS-801 466, v10 is HS-820 046, v11-14 are HS-801 467--HS-801 470, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.
Availability: GPO

HS-801 465

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 6. CODES AND LAWS

Guidelines for state and local governments are offered for a codes and laws program whose purpose is to achieve uniform traffic regulation throughout the nation. Specific objectives include the elimination of all major variations in traffic codes, laws and ordinances; increasing the compatibility of these ordinances with a unified, overall state policy; and furthering the adoption of appropriate aspects of the Rules of the Road chapter of the Uniform Vehicle Code. Purpose, authority, and general policy for the program are stated. Program development and operations are detailed in terms of: codes and laws study officer; comparison of state traffic laws with Uniform Vehicle Code; achievement of intrastate uniformity; and addi-

tional plans to achieve uniformity. Program evaluation is discussed in terms of its purpose, criteria, and recommended procedure. Additional information is given on reports necessary for the program, local government participation, representative projects, and the Highway Safety Program Standard on codes and laws.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
1974 ; 32p refs
Supersedes HS-820 042. Vol. 1 is HS-801 461, v2 is HS-801 462, v3 is HS-820 039, v4-5 are HS-801 463--HS-801 464, v7 is HS-801 349, v8 is HS-801 514, v9 is HS-801 466, v10 is HS-820 046, v11-14 are HS-801 467--HS-801 470, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.
Availability: GPO $1.20

HS-801 466

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 9. IDENTIFICATION AND SURVEILLANCE OF ACCIDENT LOCATIONS

Guidelines for state and local governments are presented for a program to promote systematic analysis of the losses experienced in motor vehicle accidents, and thereby to assist highway engineers and law enforcement and other safety program officials in focusing available resources upon corrective measures with highest priorities and best likelihood of producing significant improvements. Specific objectives include improvement of highway design features, traffic operation controls, and highway maintenance, and selective enforcement. The purpose, authority, and general policy of the program are stated. Details are given on coordination, data needs, corrective action programs, and program operation. Additional information is given on program evaluation, reports, local government participation, Highway Safety Program Standard on identification and surveillance of accident locations, representative projects, and resource organizations.

Federal Hwy. Administration, Washington, D. C.
1974 ; 49p 10refs
Supersedes HS-820 045. Vol. 1-2 are HS-801 461--HS-801 462, v3 is HS-820 039, v4-6 are HS-801 463--HS-801 465, v7 is HS-801 349, v8 is HS-801 514, v10 is HS-820 046, v11-14 are HS-801 467--HS-801 470, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.
Availability: GPO $1.55, Stock no. 5003-00182

HS-801 467

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 11. EMERGENCY MEDICAL SERVICES

Guidelines for state and local governments are presented for an Emergency Medical Services (EMS) program which aims at ensuring that victims of traffic crashes receive prompt and adequate emergency care. Such a program involves a comprehensive EMS system which includes the necessary emergency equipment, manpower, and facilities. It is noted that the proper relationships between the various services and agencies commonly involved in EMS situations; i.e., rescue agencies, ambulance services, hospital emergency departments, and law enforcement, should be established to ensure that all of the resources necessary for prompt application of definitive medical care to injured persons are activated. The purpose, authority, and general policy of the EMS program are stated. Details are given on EMS system functions and components, postadmission, state EMS program elements, personnel training, and related areas. Other topics covered include program evaluation, reports, local government participation, funding criteria for 402 EMS projects, Highway Safety Program Standard 11 (Implementation Guidelines), representative projects, resource organizations, the economics of ambulance service, and the use of helicopters in EMS.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
1974 ; 246p refs
Supersedes HS-820 047. Vol. 1-2 are HS-801 461--HS-801 462, v3 is HS-820 039, v4-6 are HS-801 463--HS-801 465, v7 is HS-801 349, v8 is HS-801 514, v9 is HS-801 466, v10 is HS-820 046, v12-14 are HS-801 468--HS-801 470, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.
Availability: GPO $3.20, Stock no. 5003-00170

HS-801 468

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 12. HIGHWAY DESIGN, CONSTRUCTION, AND MAINTENANCE

Guidelines for state and local governments are presented to assure that principles of safe design and operation are considered in the planning, construction, and maintenance of all streets and highways, resulting in the safest practicable physical environment for the road user. The purpose, authority, and general policy of the program are stated. Details of program development and operations are given, including: geometric design; pavement design and construction; pavement treatment for skid resistance; roadway lighting; crash survivability; emergency response; maintenance; work site safety; rail-highway grade crossings; pedestrian safety; land development; training. Further consideration is given to program evaluation, reports, local government participation, Highway Safety Program Standard on highway design, construction and maintenance, representative projects, and resource organizations.

Federal Hwy. Administration, Washington, D. C.
1974 ; 68p 29refs
Supersedes HS-801 157. Vol. 1-2 are HS-801 461--HS-801 462, v3 is HS-820 039, v4-6 are HS-801 463--HS-801 465, v7 is HS-801 349, v8 is HS-801 514, v9 is HS-801 466, v10 is HS-820 046, v11 is HS-801 467, v13-14 are HS-801 469--HS-801 470, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.
Availability: GPO $1.75, Stock no. 5003-00187

HS-801 469

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 13. TRAFFIC ENGINEERING SERVICES

Guidelines for state and local governments are presented to ensure the full and proper application of modern traffic engineering principles and uniform standards for traffic control in order to reduce the likelihood and severity of traffic accidents. Program development and operation is examined in terms of needs determination, priorities, manpower development, and traffic control devices. The program implementation schedule is set out including review of road projects, improvements during maintenance, operational surveillance, high-accident location correction, hazardous location analysis, needs identification, effectiveness evaluation, and traffic regulations.

Further attention is directed toward program evaluation, reports, local government participation, Highway Safety Program Standard on traffic engineering services, representative projects, management guide for a statewide inventory, traffic control device maintenance inspections, guides for an inventory on traffic signs, pavement markings, and traffic signals, and resource organizations.

Federal Hwy. Administration, Washington, D. C.
1974 ; 88p 17refs
Supersedes HS-801 158. Vol. 1-2 are HS-801 461--HS-801 462, v3 is HS-820 039, v4-6 are HS-801 463--HS-801 465, v7 is HS-801 349, v8 is HS-801 514, v9 is HS-801 466, v10 is HS-820 046, v11-12 are HS-801 467--HS-801 468, v14 is HS-801 470, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.
Availability: GPO $2.05, Stock no. 5003-00193

HS-801 470

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 14. PEDESTRIAN SAFETY

Guidelines for state and local governments are presented which aim at reducing the incidence of vehicle-pedestrian collisions and the injuries in which they result, and which stimulate recognition of pedestrian safety as an integral, constant, and important element of community planning and of all aspects of highway transportation. The purpose, authority, and general policy for the program are stated. Details offered on program development and operations include: inventory of vehicle-pedestrian crash experience, improvement of pedestrian protection, driver familiarization with pedestrian problems, pedestrian training and education, protection of child pedestrians, and enforcement. Program evaluation is explained, including evaluation factors, cost effectiveness, techniques of measurement, recommended procedure, and pedestrian safety program inventory. Consideration is also given to necessary reports, local government participation, Highway Safety Program Standard on pedestrian safety, representative projects, and resource organizations.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590; Federal Hwy. Administration, Washington, D.C. 20590
1974 ; 87p 17refs
Supersedes HS-820 048. Vol. 1-2 are HS-801 461--HS-801 462, v3 is HS-820 039, v4-6 are HS-801 463--HS-801 465, v7 is HS-801 349, v8 is HS-801 514, v9 is HS-801 466, v10 is HS-820 046, v11-13 are HS-801 467--HS-801 469, v15 is HS-801 402, v16 is HS-820 050, v17 is HS-801 329, and v18 is HS-801 471.
Availability: GPO $1.90, Stock no. 5003-00204

HS-801 471

HIGHWAY SAFETY PROGRAM MANUAL. VOL. 18. ACCIDENT INVESTIGATION AND REPORTING

Guidelines for state and local governments are presented to be used in establishing a uniform, comprehensive motor vehicle traffic accident investigation program for gathering information on motor vehicle traffic accidents and associated deaths, injuries, and property damage, and for entering the data into the traffic records system for use in planning, evaluating, and furthering highway safety program goals. The purpose, authority, and general policy of the program are stated. Details are offered on: administration, accident reporting, owner and driver reports, police accident investigation, and investigation by state accident investigation teams. Consideration is also given to program evaluation, necessary reports on the program, local government participation, the Highway Safety Program Standard on accident investigation and reporting, suggested minimum detailed information on all driver reported motor vehicle traffic accidents, representative projects, resource organizations, causes and contributing factors, and program matrix for highway safety research.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
1974 ; 60p 19refs
Supersedes HS-801 120. Vol. 1-2 are HS-801 461--HS-801 462, v3 is HS-820 039, v4-6 are HS-801 463--HS-801 465, v7 is HS-801 349, v8 is HS-801 514, v9 is HS-801 466, v10 is HS-820 046, v11-14 are HS-801 467--HS-801 470, v15 is HS-801 402, v16 is HS-820 050, and v17 is HS-801 329.
Availability: GPO $1.35, Stock no. 5003-00192

HS-801 477

CONVEX MIRROR EVALUATION QUESTIONNAIRE

A questionnaire and 132 responses are presented reporting evaluations of an experimental wide angle (convex) mirror system on cars driven by the respondents. Questions deal with present mirror effectiveness, miles driven, type of driving, type of roads, helpfulness in making safe decisions, age, sex, and type of car personally owned.

National Hwy. Traffic Safety Administration, Washington, D. C. 20590
19?? ; 11p
Availability: Reference copy only

HS-801 478

UNIFORM TIRE QUALITY GRADING. TREADWEAR. PHASE 1. FINAL REPORT

Wear testing was conducted to determine the suitability of the ASTM-G78-15 standard traction tire as a control for treadwear test as specified in Federal Register March 7, 1973. It was evident after 4000 miles of testing that the ASTM tire used as a control was an extremely long wearing tire. The tire is relatively insensitive to minor route changes. An attempt to introduce major route changes resulted in shoulder separations and groove cracking.

Compliance Testing, Inc., 1150 N. Freedom St., Ravenna, Ohio 44266
Contract DOT-HS-026-3-605
Rept. No. DOT-TST-72-1 ; 1974 ; 63p
Cover title: Tread Wear Testing for Uniform Tire Quality Grading.
Availability: NTIS

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HS-801 478

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HS-016 122

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HS-016 025

Department of Motor Transport, Traffic Accident Res. Unit, Sydney, N.S.W., Australia 2001
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HS-016 110

Department of Transportation, Transportation Systems Center, Kendall Square, Cambridge, Mass. 02142
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HS-801 355

Dept. of Motor Transport, New South Wales.
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Environmental Protection Agency, Washington, D. C.
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